The Fairchild Papers

Air Mobility

The Key to the United States National Security Strategy

Richard J. Hazdra
Major, USAF

The Fairchild Papers are monograph-length essays of value to the Air Force. The series is named in honor of Muir S. Fairchild, the first commander of Air University and the university's conceptual father. General Fairchild was part visionary, part keen taskmaster, and "Air Force to the core." His legacy is one of confidence about the future of the Air Force and the central role of Air University in that future.

AIR UNIVERSITY LIBRARY

AIR MOBILITY
The Key to the United States National Security Strategy

RICHARD J. HAZDRA
Major, USAF

Fairchild Paper

Air University Press
Maxwell Air Force Base, Alabama 36112-6615

August 2001

Library of Congress Cataloging-in-Publication Data

Hazdra, Richard J., 1961-
Air mobility : the key to the United States national security / Richard J. Hazdra.
p. cm. — ISSN 1528-2325
Includes bibliographical references and index.
ISBN 1-58566-095-7
1. Airlift, Military—United States. 2. United States. Air Mobility Command. 3. National security—United States. 4. United States—Military policy/ I. Title.

UC333.H39 2001
358.4'4'0973—dc21 2001046249

Disclaimer

Opinions, conclusions, and recommendations expressed or implied within are solely those of the author and do not necessarily represent the views of Air University, the United States Air Force, the Department of Defense, or any other US government agency. Cleared for public release: distribution unlimited.

This Fairchild Paper and others in the series are available electronically at the Air University Research Web site http://research.au.af.mil under "Research Papers" then "Special Collections."

Contents

Illustrations

Foreword

Maj Richard J. Hazdra's *Air Mobility: The Key to the United States National Security* is an examination of the force structure of Air Mobility Command (AMC) based on a model for two major theater wars. His study examines this organization's current force structure. Air mobility is the key that unlocks the national security strategy (NSS). AMC's force structure is crucial for the United States to implement its NSS. His study centers on the question: Can a force structure based on the possibility of fighting two major theater wars satisfy the requirements for steady-state operations? Major Hazdra examines three corollary issues: air mobility as a form of airpower that enables the military instrument of power in two basic ways, requirements placed on mobility air forces, and the structure of mobility air forces and the effectiveness of that structure.

Air Mobility: The Key to the United States National Security was written as a master's thesis for Air University's School of Advanced Airpower Studies, Maxwell Air Force Base, Alabama. Air University Press is pleased to present his essay as a Fairchild Paper.

Shirley Brooks Laseter

SHIRLEY BROOKS LASETER
Director
Air University (AU) Library/AU Press

About the Author

Maj Richard J. Hazdra

Maj Richard J. Hazdra (BA, Benedictine University; MAS, Embry–Riddle Aeronautical University); and MAAS, School of Advanced Airpower Studies) is joint transportation plans officer in the Operations and Logistics Directorate, assigned to United States Transportation Command headquarters at Scott Air Force Base (AFB), Illinois. He is a senior navigator with more than 2,000 hours of flying time and a Persian Gulf War veteran with more than 300 combat and support flight hours during Operation Desert Storm. Major Hazdra received his commission through the Air Force Officer Training School at Lackland AFB, Texas, in 1986. He graduated from Undergraduate Navigator Training (UNT) School at Mather AFB, California, in 1987. From 1987 until 1990, he performed KC-135A navigator duties while assigned to the 410th Bombardment Wing at K. I. Sawyer AFB, Michigan. During his assignment at K. I. Sawyer, he was the youngest navigator to fly in Strategic Air Command's Bombing and Navigation Competition in 1987. From 1990 until 1996—while assigned to the 19th Air Refueling Wing at Robins AFB, Georgia—he was an instructor navigator, a standardization and evaluation navigator, chief of ground and tanker scheduling, an executive officer, and chief of Strategic Combat Plans. From 1996 until 1998—while assigned to the 12th Flying Training Wing at Randolph AFB, Texas—he performed the duties of instructor

navigator, chief of joint UNT student control, and executive officer. Major Hazdra is a graduate of Air Command and Staff College at Maxwell AFB, Alabama. He is married to the former Susan L. Thalmann of Oakbrook Terrace, Illinois, and they have one daughter, Jacqueline.

Acknowledgments

I thank my wife Sue and our daughter Jacqueline, whose time and patience allowed me to be a parent in absentia. I thank Dr. James S. Corum for his outstanding advice and guidance and Dr. Forrest E. Morgan, whose advice and guidance helped me present a clear picture of the Air Mobility Command (AMC) force structure issues. A special thanks to the assistant dean of the School of Advanced Airpower Studies, Professor Dennis M. Drew, for teaching me to get my ideas on paper effectively. After talking on radio as a navigator for 12 years, I became accustomed to very short, even curt, sentences. Also from AMC, I thank Col Mike Fricano, Col Robert Owen, and Col John Brower (the AMC chair at Air University) for clarifying much of the data required on this project.

Abstract

Since airlift was first used as a tool of national security during the Berlin airlift, it has grown to deliver passengers, cargo, and fuel to operations worldwide in support of national security. However, Air Mobility Command (AMC) is the single organization that performs for air mobility for the United States (US). Currently, the US Air Force (USAF) has structured AMC for war; yet this command performs operations during times when the United States is at peace. AMC performs missions to support US military operations in hostile environments as well as humanitarian operations in nonhostile environments. The number of operations requiring mobility air forces has been on the rise since the Cold War ended. These steady-state operations seem to overtask mobility air forces. This study centers on the question: Can AMC's force structure, organized for two major theater wars, fulfill that requirement and perform the steady-state operations in today's strategic environment? This study finds that AMC's force structure cannot meet its requirements for two major theater wars and that the current force structure is inefficient in meeting the requirements for steady-state operations. First, this study presents a primer to acclimate the reader to the complex environment and multifaceted requirements of mobility air forces. Second, it examines AMC's current force structure as determined by Department of Defense (DOD) requirements for war. Third, this study describes the various types of missions that AMC performs on a steady-state basis and evaluates the importance of these operations in fulfilling US national security strategy. Fourth, this study recommends action that the USAF and the DOD should investigate in order to improve their air mobility capabilities in support of the national security strategy.

Chapter 1

Introduction

> *If we do not build a transportation system that can meet the needs of tomorrow, then it doesn't matter much what kind of force we have because it won't be able to get there.*
>
> —Gen John M. Shalikashvili, US Army

Air mobility is the key to unlocking the strength of United States (US) airpower because it performs rapid global mobility. US military forces have relied on this capability since World War II, and it has always been there. Combatant commanders increasingly rely on air mobility to transport forces quickly into their theaters to head off potential crises, and Air Mobility Command (AMC) always responds enthusiastically with the necessary assets. When the National Command Authorities (NCA) task the Department of Defense (DOD) to achieve any objective, it relies on AMC to achieve rapid global mobility requirements. Consequently, mobility air forces have a remarkable reputation for getting the job done for DOD and combatant commanders. Since AMC has always achieved its objectives, neither the US Air Force (USAF) nor DOD has conducted a thorough examination to determine if air mobility capabilities will suffice in the future. However, the time has come to review the force structure of AMC to determine if it can realistically continue to meet national security requirements.

Key to National Security

Air mobility is the key that unlocks the national security strategy (NSS); and, consequently, AMC's force structure is crucial for the United States to implement its NSS. This study examines the force structure of AMC, which is based on a model for two major theater wars. However, the NSS requires US military forces to perform duties over a range of operations worldwide; and, in fact, DOD has increasingly deployed military forces toward those ends. This study asks the question:

Can a force structure based on the possibility of fighting two major theater wars satisfy the requirements for steady-state operations? AMC's force structure is the key to the NSS because it ultimately determines how far and how fast the USAF can achieve its vision of global engagement. Air mobility provides the quickest mode of transportation to move military forces into an area where US interests are at stake, whether for peaceful engagement or for combat operations.

For more than 50 years, the United States has employed air mobility assets to advance US interests and policies—often without employing combat operations. The Berlin airlift—where aircraft supplied an entire city from June 1948 to August 1949—is probably the most famous example of airpower used in a peaceful context. In contrast, airlift over The Himalayas to supply US Army Air Forces operations in China during World War II demonstrates the use of air mobility to supply combat operations.

Air mobility is a flexible, nondestructive form of airpower. Yet, mobility air forces are also designed to support joint operations in two major theater wars. Since the end of the Cold War, the US NSS that has emphasized "presence" and "engagement" has placed unprecedented demands on air mobility forces. The practical question to ask is the following: Should AMC continue to design its force structure on a two major theater wars model?

Three Issues

This author examines three corollary issues. The first issue concerns air mobility as a form of airpower that enables the military instrument of power in two basic ways. First, mobility air forces can rapidly transport combat air units to any point on the planet in order to execute operations directed by NCA. Second, mobility air forces support peace operations that reinforce national-political objectives. These peacetime operations display US commitment to its interests and allies while building goodwill among nonallied nations.[1] In evaluating the effectiveness of these peacetime operations, it is important to ask the question: Do they deter potential adversaries?

The second issue addresses the requirements placed on mobility air forces. During the 1990s, the NCA employed mobility air forces as a political-military tool. However, while downsizing, DOD did not anticipate the increased requirement for mobility air forces as a political-military tool. A review of the employment of mobility air forces in the 1990s will look at the missions they performed.

The third issue is the structure of mobility air forces and the effectiveness of that structure. AMC is emerging as a primary military instrument of power within the USAF. Thus, three questions are important:

- Is the force structure of AMC adequate to meet the demands of two major theater wars?
- Can mobility air forces meet the increased demands placed on them by the NCA?
- Has the Air Force correctly prioritized air mobility in its overall force modernization plan?

Literature Review

Some strategic documents, studies, and articles have already addressed these issues, although the studies have been limited in scope. The *Report of the Quadrennial Defense Review (QDR)* and *Transforming Defense: National Security in the 21st Century,* the National Defense Panel (NDP) report, are just two of those studies. The authors of these documents and studies wrote for specific purposes other than examining the structure of mobility air forces; and, consequently, they do not address the issues pertinent to the structure of mobility air forces.* It is important to take a more comprehensive look to understand the strengths and weaknesses of air mobility. Understanding mobility air forces provides a foundation from which the Air Force can employ these forces to achieve the objectives set forth in the national security documents mentioned in this study.

*Please refer to the bibliography to ascertain those strategic documents titled "Works That Exclude Mobility Force Structure."

The *Mobility Requirements Study Bottom-Up Review Update (MRS BURU)* evaluated the requirements to support two major theater wars beginning within 30 days of each other.[2] In that context, air mobility forces would support friendly forces in halting the adversary in the first theater while building up equipment and supplies for the counteroffensive within 30 days. Once the adversary stopped his offensive, a reduced number of air force mobility assets would sustain operations, while the preponderance of mobility air forces would transfer to a second theater to support friendly forces in halting another adversary. This scenario raises numerous questions about the current state of mobility air forces.

- Can AMC provide enough support to friendly forces for them to halt an enemy in the first theater of operations?
- Does AMC possess enough assets to sustain one theater of operations while building up friendly forces in a second theater of operations?
- Can AMC's force structure meet the requirements to build up and support friendly forces if two major theater wars break out in less than 30 days?

AMC's long-range plans address the requirements imposed on mobility air forces that the *MRS BURU* determined.[3] In addition, AMC's long-range plans deal with the requirements to upgrade the current fleet of strategic aircraft to comply with the new aviation regulations in both the United States and Europe. This author analyzes these long-range plans to examine the feasibility of AMC meeting the requirements for two major theater wars.

Several congressional studies address the requirements to acquire the C-17 and upgrade existing airframes such as the C-5 and C-130. All of these studies base their recommendations for air mobility requirements on the model for two major theater wars rather than the current operations tempo of these airframes. Thus, the following question: Can a force structure oriented toward the possibility of two major theater wars meet the requirements of today's current steady-state operations?

The *QDR* examined the US defense strategy and dealt with the strategic environment for US military operations. The worst-case threat scenario in the *QDR* is two major theater wars. The *QDR* acknowledges the role that air mobility will play when units respond to crises more quickly and have less time to prepare.[4] The *QDR* cites the C-17 program as a solution for these challenges in meeting the requirements for airlift.[5] The *QDR*, however, stops short of specifically addressing what force structure AMC will require to perform rapid global mobility. The *QDR* only says "Across the services, changes in force structure and personnel end strength will be made to reflect improvements in operational concepts and organizational arrangements and to protect the full spectrum of combat capability to the maximum extent possible." Should DOD examine the force structure of AMC to meet the requirements set forth in the *QDR?*

The NDP examined the requirements to transform the US military force structure into one that could meet the needs of future national security. This panel considered the two major theater wars model to be a force-sizing function rather than a strategy. According to the NDP, the force structure must have the ability to respond to new challenges from information attacks, weapons of mass destruction (WMD), space operations, the absence of forward bases, deep inland operations, and mass refugee and disease problems. Of these, the latter two challenges raise questions about the current force structure of mobility air forces. Can today's AMC force structure provide the support needed to conduct deep inland operations with reduced access to forward bases? Can today's airlift assets provide necessary relief supplies to mass refugees or epidemic inflicted populations? This study examines AMC's current force structure and looks at its capability to perform these operations.

Methodology

Several questions are relevant:

- Where does AMC fit into the defense transportation structure?

- What is the basis of AMC's force structure?
- What requirements are placed on mobility air forces?
- How are these requirements calculated?
- Can mobility air achieve these requirements?
- How has US Transportation Command (USTRANSCOM) employed mobility air forces to accommodate the growth of steady-state operations during the last decade of the twentieth century?
- Are there any technologies that could facilitate AMC's growth of steady-state operations?
- Can mobility air forces become more efficient?

To answer these questions, this study first looks at USTRANSCOM's organization. It also looks at the history of the operational employment of mobility air forces since 1990 to include Operation Desert Storm, the largest major theater war of the 1990s. This study examines ways in which DOD and the USAF can make mobility air more efficient and examines the current AMC force structure. Aspects of the force structure that this study examines include the USTRANSCOM, AMC, the two major theater wars model, military operations that have taken place around the world during the 1990s, and the NSS.

This study first defines and explains the complex networks that make up the defense transportation system (DTS). Second, it examines when and why AMC employs specific air transport systems and distinguishes between commercial versus military air transportation. The next step will be to analyze how best to employ both commercial and military air transportation and look at their respective strengths and weaknesses. Major regional contingencies and the steady-state operations imposed by the William J. "Bill" Clinton administration present a dynamic set of circumstances. This study examines reports from past AMC commanders, air mobility experts, reports submitted to Congress, and historical data pertaining to the use of airlift assets. In introducing this evidence, this study analyzes whether AMC's force structure—

currently based on a two major theater wars model—is suited for either that model or for steady-state operations.

This work organizes the research into three sections and further divides into seven chapters. Chapter 1 provides the background from which to understand the air mobility system. Chapter 2 examines the complexities of the DTS and the role that AMC fulfills in USTRANSCOM. It explains where and how AMC fits into this complex system. Chapter 3 analyzes the force structure requirements of AMC based on the two major theater wars model and explains the metric used to determine those requirements. This chapter also examines time-phased force deployment data (TPFDD) requirements and explains their incongruities. Chapter 4 examines the current force structure that includes both the aircraft and personnel that perform the air mobility mission. This chapter looks at how well that force structure can meet the requirements defined in chapter 2. Chapter 5 examines the requirements for a force structure based on AMC's current steady-state operations that mobility air forces perform daily around the world. This chapter analyzes the mobility air forces' role in the different types of operations implemented during the 1990s. Chapter 6 also critically examines the implied requirement for air mobility forces and the implications arising from military intervention that emanate from the NSS. This chapter also looks at some technological innovations that could better facilitate the employment of air mobility forces for these military interventions.

Importance

The USAF and DOD exploit air mobility as a form of airpower because of the positive political gains from noncombat operations, deterrence, and combat when necessary. The structure of mobility air forces determines their efficiency when performing their missions. In answering the questions set forth, this study sheds light on the issues surrounding AMC's force structure.

Notes

1. Keith A. Hutcheson and Charles T. Robertson, *Air Mobility: The Evolution of Global Reach* (Vienna, Va.: Point One, September 1999), 139.

2. Department of Defense, Logistics Directorate, *Mobility Requirements Study Bottom-Up Review Update* (Washington, D.C.: Joint Chiefs of Staff, 28 March 1995). It is commonly referred to as *MRS BURU.*

3. Air Mobility Command (AMC), *1998 Air Mobility Master Plan: Rapid Global Mobility* (Scott Air Force Base [AFB], Ill.: AMC, Directorate of Plans and Programs, October 1997); and *Air Mobility Strategic 2000* (Scott AFB, Ill.: AMC, Directorate of Plans and Programs, November 1999).

4. William S. Cohen, secretary of defense, *Report of the Quadrennial Defense Review*, Washington, D.C.: Government Printing Office, May 1997, sec. 6, 3.

5. Ibid., sec. 7, 2.

Chapter 2

The Mobility System

Supply and Transport stand together or fall apart; history depends on both.

—Prime Minister Winston S. Churchill

Air mobility is both a complex system and a part of an interrelated transportation system. Many people perceive ambiguity when discussing air mobility issues or they fail to comprehend aspects of the DTS. This chapter is a primer for those who have questions about what air mobility is and how it fits into DOD.

To understand AMC's force structure it is important to outline how it fits into USTRANSCOM, a command that integrates a vast array of commercial and military organizations employing different modes of transportation into a mobility force. To understand the DTS one must first identify the responsibilities of USTRANSCOM and its component commands. Numerous missions and airlift programs of AMC combine to form a complex air mobility system.

US Transportation Command

USTRANSCOM evolved quickly under the auspices of the Goldwater–Nichols Act, as DOD's single manager for DOD transportation requirements.[1] Originally consigned to manage only wartime transportation requirements, a memorandum in February 1992 from the Office of the Secretary of Defense designated USTRANSCOM as the single management organization for defense transportation in both peace and war following the Persian Gulf War. DOD Directive 5158.4 formalized this decision on 8 January 1993 and transferred command authority of AMC, Military Sealift Command (MSC), and Military Traffic Management Command (MTMC) along with all military transportation assets to USTRANSCOM.

USTRANSCOM executes its mission through three component commands as well as the component command's respective Reserve, National Guard, and commercial counterparts. MSC—the US Navy (USN) component—provides sea-lift services and executes the Voluntary Intermodal Sealift Agreement contracts for chartered ships. MTMC—the Army component of Transportation Command—provides traffic management services and traffic engineering, administers the contingency response program, and serves as the single port manager. AMC, the airlift component of USTRANSCOM, provides airlift, aerial refueling, medical evacuation transportation services, and aerial port management services. AMC is also the single point of contact with the commercial airline industry for procurement of defense airlift services and mobilizing the Civil Reserve Air Fleet (CRAF).

Approximately one-third of USTRANSCOM's capability relies on Reserve and National Guard forces. Reserve forces comprise 46 percent of AMC's airlift capability, 88 percent of MSC's capability, and 56 percent of MTMC's capability.[2] The Reserve forces and National Guard work with their active duty colleagues on a daily basis to execute USTRANSCOM's peacetime mission.

Transport of Military Forces

During peacetime, the services and Defense Logistics Agency (DLA) determine which forces require movement and collect information on force requirements for troops, materials, and equipment. Subsequently, the services and DLA submit transportation requests for military forces movement to USTRANSCOM, who then plans the movement. USTRANSCOM, through its traffic management function, allocates transportation resources for those movements and executes them.

In preparation for potential crisis or war and when directed by the Office of the Joint Chiefs of Staff (JCS) or the NCA, theater commanders plan operations within their own area of responsibility (AOR). In doing so, they identify their specific requirements and recommend the TPFDD of forces to arrive in-theater for specific operations.[3] The theater commander's TPFDD identifies the units that will support the operation,

along with the priority and sequence of arrival in-theater of those units to include their route, type of transportation, and port of debarkation. USTRANSCOM determines the feasibility of the theater commander's TPFDD based on an assessment of strategic and theater lift assets available, the requested transportation infrastructures, and the apportioned transportation resources. Next, USTRANSCOM works in conjunction with the theater commander to adjust the TPFDD in order to make it feasible. When a theater commander subsequently certifies the TPFDD, USTRANSCOM loads the appropriate TPFDD into the Joint Operation Planning and Execution System (JOPES).[4] This system provides subordinate commanders and planners with mobilization information and the time-phased deployment schedule of the military forces tasked to support the executed military operation. JOPES also provides them with the transportation information required to sustain the military operation. This process can occur over several months.

Strategic Mobility Triad

USTRANSCOM combines the attributes of sea lift, prepositioning, and airlift into a synergistic force multiplier to meet the transportation requirements set forth in JOPES for any planned operation. DTS provides transportation for military forces along with the necessary support material and equipment needed both to initiate an operation and to sustain it. Military operations require the deployment of troops and equipment within days because of global interests and the tendency for political and military situations around the world to change rapidly. Theater commanders rely on USTRANSCOM to fill the transportation requirements of a reaction force. In achieving those requirements, the mobility triad strategy meets three basic criteria:

- It rapidly deploys military forces.
- It sustains them until the combatant commander achieves the military objectives.
- It redeploys these forces either back to the United States or to another theater of operations.[5]

The strategic mobility triad combines the attributes of sea lift, prepositioning, and airlift into a synergistic force multiplier to meet the transportation requirements of military operations.

Sea Lift

Simply by virtue of the size of heavy cargo ships, sea lift provides the best means to move the largest quantity of equipment, materials, and supplies at the lowest cost. Sea lift is especially useful in meeting the demand to transport outsized cargo such as tanks and other large pieces of equipment necessary to sustain forces. AMC categorizes an item as outsized if it is too large to fit on either a typical commercial air transport or a C-141, its core airlifter. However, the capabilities to transport large amounts of oversized and outsized equipment by sea lift has a drawback in taking more time to transport. Ships operate in terms of days and weeks, and aircraft operate in terms of hours. Yet, without the capability of sea-lift assets to transport in great quantities, the US military would be severely limited.

Prepositioning

Prepositioning provides deployed forces with the equipment and supplies they need to conduct operations without USTRANSCOM having to move those supplies. Prepositioning reduces the time needed to place the necessary military forces into the theater of operations. Prepositioning may consist of cargo ships afloat near the theater of operations.[6] These ships contain equipment and materials for forces required for the operation as set forth in JOPES. Prepositioning may also consist of shore-based storage facilities. Both prepositioning strategies reduce the response time of US armed forces. Prepositioning is critical to the success of USTRANSCOM during war because it reduces the transportation requirements for operations. In addition, without prepositioning, airlift assets would be unable to achieve rapid global mobility for all the forces required in an operation.

Airlift

Time-sensitive lift requirements—short notice transportation requirements due to changing tactical situations or other

developments that require a rapid response—depend on airlift capabilities.[7] The determination of unplanned movement requirements depends on whether or not the president has directed the execution of the operations plan. Before the execution of an operations plan, combatant commanders can request to use special assignment airlift missions. However, due to the limited availability of airlift assets, USTRANSCOM controls these special assignment airlift missions to ensure airlift availability for the execution of the operations plan. Once the president directs an operations plan, unexpected transportation requirements invariably occur. However, since allocated airlift assets are already committed, USTRANSCOM—in coordination with the combatant commander—will attempt to perform the airlift requirement in one of three ways: use airlift assets from North Atlantic Treaty Organization (NATO) or allied nations, defer movement of lower priority requirements to sea lift, or request airlift reallocation from the chairman of the JCS through the Joint Transportation Board.[8] Airlift, because of its rapid global mobility burden, is often the most restrictive factor in conducting operations.

Air Mobility Command

On 1 June 1992 the Air Force activated AMC to replace Military Airlift Command (MAC).[9] Gen Hansford T. Johnson, formerly commander in chief (CINC), MAC, became the commander of AMC and retained his position as CINC of USTRANSCOM.

The Air Force designated AMC as the lead command for air mobility issues in October 1996.[10] In this capacity, AMC develops weapon system standards and integrates command and control (C^2) processes for forces. To comply with these responsibilities, AMC standardizes global air mobility processes and functions. Furthermore, AMC is present around the world with fixed operating sites, deployable support teams, liaison teams, and air mobility forces continuously operating. As noted, AMC controls several air mobility components to execute its mobility missions that, in turn, encompass a multitude of airlift programs.

To handle this complex system of programs and assets, the tanker airlift control center (TACC) tasks units to schedule, task,

manage, coordinate, control, and execute AMC missions and requirements. The TACC provides centralized control of air mobility assets as the single point of contact for the worldwide air mobility missions. This system includes fixed and deployable en route mission support forces. Through the Global Transportation Network (GTN), the TACC is able to track the status and location of personnel and cargo, which USTRANSCOM and AMC commonly refer to as in-transit visibility.

Air Mobility Components

The air mobility system is comprised of four main components: the active duty forces, the Air Force Reserve (AFRes) forces, the Air National Guard (ANG) forces, and the CRAF commercial air carriers. Together these elements meet airlift requirements by providing the crews, aircraft, and support forces for strategic air mobility operations, in-theater air mobility operations, and operational support airlift. Unfortunately, the air mobility system has a limited surge capability to meet any Joint Task Force (JTF) requirement during a crisis.

Active Duty

Military personnel on active duty comprise the core of the staff personnel at AMC headquarters, where they perform the staff duties to execute the airlift programs and orders. Active duty forces also conduct the core day-to-day airlift missions and most of those missions requiring special training and equipment. They provide accessible and flexible airlift, immediately available, for worldwide duty. While active duty airlift forces offer a great advantage in terms of availability on a full-time basis, airlift demand consistently outpaces availability. Consequently, AMC relies on both the ANG and the AFRes to help meet the daily demands of the airlift system.

Air Force Reserve and Air National Guard

During peacetime, the AFRes and ANG provide significant volunteer forces and assets to augment active duty manpower and equipment. AFRes and ANG forces maintain the same

mission-ready status as their active duty counterparts. They both provide strategic air mobility forces to the USTRANSCOM and in-theater, air mobility forces to theater commanders. These forces also perform unique missions such as aerial fire fighting, hurricane hunting, aerial spray operations, and psychological operations. ANG forces are also available to their state governors. These volunteer forces maintain a delicate balance between their peacetime mission requirements and the needs of their civilian employers. When mobilized by the president, however, AFRes and ANG units are placed on active duty status and may be used in the same manner as active duty units.

Civil Reserve Air Fleet

The CRAF provides increased airlift capacity to USTRANSCOM during contingency and wartime operations. It provides commercial aircraft and aircrew to augment active duty, ANG, and AFRes forces. In the CRAF program, commercial air carriers voluntarily commit aircraft to augment airlift requirements that exceed the capabilities of AMC's military fleet. Commercial air carriers pledge their aircraft through one or more of three stages: stage one, committed expansion; stage two, defense airlift emergency; and stage three, national emergency. The CRAF program provides a sizable portion of strategic airlift capability without the government having to purchase additional aircraft, pay personnel costs, or fly and maintain the aircraft. Airlines, however, get generous subsidies to conduct these sorties. As the demand for airlift increases in a conflict, the commander of USTRANSCOM, upon approval of the secretary of defense, may incrementally activate the CRAF in stages based on the urgency of airlift requirements. According to a recent RAND study, replacing the CRAF capability with military aircraft would have cost DOD about $1 billion to $3 billion annually over the past 30 years.[11] DOD rewards commercial air carriers for CRAF participation with DTS business during peacetime through a variety of subsidy programs.[12]

Air Mobility Missions

The above air mobility components integrate to perform the triad of missions that AMC is responsible for providing to DOD: air mobility support, aerial refueling, and airlift. This air mobility triad integrates into an air mobility force. Air mobility support provides the foundation of the triad because airlift and air refueling can operate independently, but neither can operate without air mobility support. The aerial refueling mission encompasses 11 separate tasks, and the airlift mission encompasses five separate tasks—all 16 of these tasks are critically important to DOD.

Air Mobility Support

All AMC bases, both domestic and overseas, provide services for C^2, aerial port operations, aircraft maintenance, operating airport facilities, weather, fire protection, life support, and intelligence to air mobility assets. At overseas locations, if the host nation is unable to provide any of these services, AMC augments those units as needed.

Each air mobility support squadron operates an air mobility control center, which serves as the C^2 conduit to the TACC in order for them to track air mobility sorties. The GTN links the various C^2 systems to provide theater and subordinate commanders with the transportation status of personnel and cargo.

Two air mobility support groups and their subordinate air mobility support squadrons—12 in all—provide en route support at 12 different overseas locations. These units provide worldwide support to air mobility operations at fixed en route locations along established channel structures. Whereas an air mobility wing retains operational control of most air mobility support units within the United States, the TACC holds operational control over the air mobility support groups along with their subordinate squadrons.[13] Administrative control for these units conversely falls to their respective numbered air forces (fig. 1).

At overseas locations, air mobility support units—depending on requirements—provide maintenance and airhead operations. Maintenance regenerates aircraft versus providing sustained maintenance and also aircraft marshaling, parking, re-

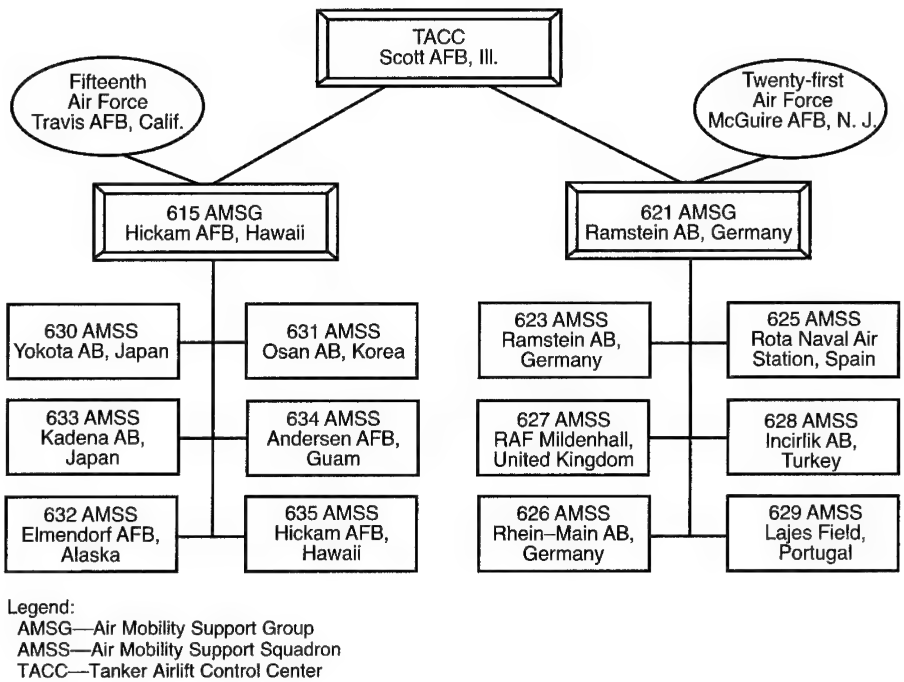


Figure 1. En Route Force Structure

fueling, and limited aircraft troubleshooting and repair capability. If specific aircraft repair capability is required, an additional maintenance recovery team will deploy with specialists, equipment, and parts to accomplish the repair. Airheads onload and offload a set number of aircraft based on forecast requirements. Aerial port specialists establish a marshaling yard and traffic routing for cargo, aircraft servicing, passenger manifesting, and air terminal operations. They also coordinate intertheater and intratheater air mobility operations by coordinating numerous activities: airbridge operations, channel route operations, international airfield surveys, and host-nation support. Air mobility support units tailor services to meet the requirements of specific operations.

Aerial Refueling

Tankers perform strategic missions between the continental United States (CONUS) and theaters of operation as well as operational and tactical missions within a theater of opera-

tion. Tankers perform seven strategic missions: single integrated operation plan (SIOP) execution, global attack support, airbridge support, coronets, airlift, force extension, and dual role.[14] Tankers enable aircraft to fly nonstop from the United States to any location on the globe and return. The benefits are threefold. First, tankers eliminate requirements for landing rights in foreign countries. Second, they reduce the need for intermediate basing to refuel and maintain aircraft. Third, they maximize aircraft payloads, either airlifters or combat aircraft, without sacrificing range.

Tankers also perform four operational and tactical missions: theater support, special operations support, search and rescue support, and emergency refueling.[15] Tankers provide military aircraft with a longer airborne endurance, both operationally and tactically, which results in reducing their regeneration time.

The Air Force acknowledged the critical importance of these tasks in the following statement:

> Faced with the potential of reduced overseas bases for all US forces, the concept of global reach becomes increasingly important and highlights the aerial tanker as a critical asset in meeting future needs. Air Force tankers refuel Air Force, USCENTCOM, Marine and many allied aircraft, leveraging all service capabilities on land, sea, and in the air. Aerial refueling increases the range, on station times, and ordnance capabilities of receiving aircraft—true force multiplication . . . The increased emphasis on rapid response and global reach will only enhance the value of our tanker force.[16]

In short, aerial refueling provides the NCA with a wider range of military options.

Airlift

Air mobility components perform airlift missions in support of strategic, operational, and tactical objectives. Strategic lift transports cargo and passengers between the United States and theaters of operation, as well as between theaters of operation, a function referred to as intertheater airlift. Tactical airlift transports cargo and passengers within a theater of operations, a task referred to as intratheater airlift. Airlifters perform five missions: routine passenger and cargo movement, exercise and contingency operations, special air missions, aeromedical evacuation, and special operations support.[17]

Airlift Programs

In addition to meeting the need to transport military forces, DOD relies on airlift for the daily requirements of defense business during peacetime. As in any global organization or business, the demands for airlift have increased due to the nature of aerial lines of communication (ALOC), which can transport material and people around the world in a matter of hours. AMC is the primary command responsible for airlift within the DTS. To meet the increasing demand, numerous types of missions work synergistically to provide defense planners and commanders with the capabilities to move rapidly anything, anywhere over the planet. The Air Force acknowledges the importance of airlift as noted in its doctrine:

> Airlift is an important national resource and plays a key role in any US response to counter threats to its national security. More than just airframes and aircrews, it is a seamless and responsive system providing the NCA and combatant commanders the airlift necessary to move personnel and cargo anywhere, any time. Capable of responding to any tasking across the spectrum of operations and under a variety of conditions, airlift is a vital component of rapid global mobility.[18]

AMC administers numerous airlift programs to meet the challenge of a growing demand for airlift with reduced airlift assets. Commercial carriers under AMC contract and execute many of these programs.

Routine airlift sorties meet the transportation requirements to deploy, sustain, and redeploy military forces. In nonroutine situations, AMC first validates the request and then, based on the requirements, satisfies the request through one of the many programs that it administers. Below are descriptions of eight airlift programs that enhance AMC's mission management of airlift missions.

Channel Missions

A hub-and-spoke system, similar to the airline system, maintains more than 500 routes worldwide to routinely transport passengers and cargo internationally and within a theater. AMC schedules both military aircraft and contracted commercial aircraft for these missions. Channel missions op-

erate daily, but the frequency of individual routes depends on the volume of cargo and passengers.

Special Assignment Airlift Missions

AMC operates special assignment airlift missions to satisfy unique requirements for pickup and delivery at locations other than those established within AMC's channel structure. Assignment of these missions considers the number of passengers, urgency or sensitivity of the mission, weight and size of the cargo, special characteristics of the cargo, and any other special characteristics of the mission. Special assignment airlift missions to transport nuclear weapons receive prioritization through the JCS priority system.

Air Mobility Express

The majority of equipment and materials will move on channel missions. However, at the request of a combatant commander, often during contingency operations, USTRANSCOM may establish an express service called "air mobility express" to move equipment and materials directly to a combatant commander's AOR. Air mobility express uses new routes to transport materials and equipment directly to a new distribution center, which the theater commander must first establish.

Commercial Carrier Contract Programs

AMC contracts with commercial carriers to perform the majority of passenger and bulk cargo deliveries. The contracts execute five airlift programs: worldwide express, domestic small package, city pairs, tenders, and category contracts.[19] AMC executes 18 different categories of airlift through contracted commercial carriers.[20] USTRANSCOM employs these programs to transport most of the US Army's Class IX supplies—spare parts—which is the Army's top airlift priority.

Demands on Airlift

The daily demands for mobility air forces are vast. This chapter has outlined the background to understand the complexities

and intricacies of the Air Force's largest and most diverse command, AMC. USTRANSCOM meets the needs of the DTS, with AMC as a vital component of that system. AMC's air mobility system comes into focus as a force multiplier for DOD. AMC performs 11 tanker missions and five airlift missions through the execution of eight airlift programs in order to manage its growing airlift requirements. The rapid global response provided by airlift and the versatility and flexibility that tankers provide place many demands on AMC's force structure.

Notes

1. *Goldwater–Nichols Department of Defense Reorganization Act of 1986,* Public Law 433, 99th Cong., 2d sess., H.R. 2181.
2. USTRANSCOM Handbook 24-2, *Understanding the Defense Transportation System,* 1 October 1998, 3.
3. Joint Publication (JP) 3-35, *Joint Deployment and Redeployment Operations,* 7 September 1999, I-6.
4. JP 5-03.1, *Joint Operational Planning and Execution System,* vol. 1, *Planning Policies and Procedures,* 4 August 1993, N-5 to N-10.
5. JP 3-35, I-8.
6. Ibid., I-9.
7. JP 4-01, *Joint Doctrine for the Defense Transportation System,* 17 June 1997, IV-5.
8. Ibid., IV-5.
9. History, Air Mobility Command (AMC), *Air Mobility Command 1992 Historical Highlights,* Scott Air Force Base (AFB), Ill.: AMC History Office, 1993, 1–5.
10. Ibid.
11. Jean R. Gebman, Lois J. Batchelder, and Katherine M. Peohlmann, *Finding the Right Mix of Military and Civil Airlift,* vol. 2, *Issues and Implications,* Report no. MR-406/2-AF (Santa Monica, Calif.: RAND, 1994), 40–43.
12. Peter Grier, "The Comeback of CRAF," *Air Force Magazine,* July 1995, 3. CRAF subsidies from the US government are estimated to exceed $2 billion dollars a year based on information compiled from the USTRANSCOM Handbook 24-2. CRAF carriers receive preference when applying for nondefense business from the US government, and they can conduct commercial business at military bases.
13. Air Force Doctrine Document (AFDD) 2-6.1, *Airlift Operations,* 13 November 1999, 62.
14. AFDD 2-6.2, *Air Refueling,* 19 July 1999.
15. Ibid.
16. *Global Reach—Global Power: The Air Force and US National Security,* White Paper (Washington, D.C.: Department of the Air Force, 1990); and AFDD 2-6.1, 3.
17. AFDD 2-6.1 details these missions.
18. Ibid., 16–17.
19. USTRANCOM Handbook 24-2 details these missions.

20. AMC, *Air Mobility Command, Command Data Book* (Scott AFB, Ill.: Quality and Management Innovation Flight, November 1999), 105–6.

Chapter 3

Force Structure Requirements

The ability to move our forces rapidly and in the right configuration is key to their effectiveness. Most importantly, the greater their mobility, the greater their protection.

—National Defense Panel Report
December 1997

The force structure requirements for mobility air forces depend on many questions that emanate from a decision to deploy military forces to a theater of operations. The first four questions revolve around the nature of the conflict: Who are the aggressors? What does the NCA want the military to accomplish? How much warning will the military have? Will military forces work in coalition, alliance, or alone? The fifth question asks which military forces would deploy first. The final set of questions revolves around transportation. For example, will military and commercial transportation be available when needed, and will the modes of transportation perform as expected? This last set of questions raises debates about how much lift is enough.

Planning Deployments

When planning deployments for potential operations, TPFDD planners decide how to allocate resources for lift because acquiring enough mobility forces to cover all possible contingency operations would be too costly. However, airlift requirements established by TPFDD planners during the Cold War provide an example. During President Ronald W. Reagan's administration, DOD set a goal to acquire enough airlift assets to transport 66 million ton miles per day (MTM/D), which was more than twice the capacity at the time. In trying to achieve that goal, Congress authorized funds to acquire both C-5Bs and KC-10s as well as develop the C-17.[1] In 1979 AMC planned to acquire 210 C-17s, but in April 1990 it reduced

that number to 120 because of the change in the threat.[2] According to DOD the 66 MTM/D would provide insufficient airlift capacity to meet mobility requirements for a conflict with the Soviet Union, but they lowered the airlift requirement anyway to comply with financial restrictions.[3] During Operation Desert Storm, US Central Command (USCENTCOM) estimated that it would employ airlift at the average rate of 33 MTM/D in transporting only 17 percent of the US military forces.[4]

A Model for Two Major Theater Wars

The questions revolving around strategic mobility are more prevalent today than during the Cold War because of the numerous operations that mobility air forces currently perform around the globe. During the Cold War, conversely, strategic mobility focused on the needs for a conflict against the Soviet Union.

The *MRS BURU* is the most recent study on mobility requirements. It focused on two major theater wars because military planners believe that this model would place the greatest demands on strategic mobility. In contrast to the *MRS BURU,* this study proposes to determine future lift requirements based on AMC's steady-state operations because the pace of these operations overlap each other, and seldom does that pace slow down. This study recognizes that should a single major theater war occur, these steady-state operations would have to cease in order for AMC to perform the required airlift into the theater of operations.

The *MRS BURU* developed scenarios where rapid global mobility first halts each enemy air advance before friendly forces initiate a counteroffensive.[5] *MRS BURU* analyzed the benefits of transporting combat forces by estimating the risk to friendly forces when airlifting them into theater versus slower means of deployment. There are many uncertainties in any analysis of mobility requirements, and some mobility experts believe that analysis alone cannot determine the requirement for airlift because operations are seldom executed as planned.[6] For

example, during the deployment for Operation Joint Endeavor, the TPFDD changed an average of 14 times a day.[7]

Under the model for the two major theater wars espoused in the *MRS BURU,* the NCA should decide how much the United States will pay to lower the risks incurred with deploying forces abroad. The Congressional Budget Office suggested that TPFDD planners focus on the minimum number of forces that they believe will meet the needs of two major theater wars without weighing the risks and costs of alternative levels of airlift capacity.[8]

In 1995 the Clinton administration recommended acquiring 120 C-17s for strategic airlift.[9] AMC compared costs and capabilities of the C-17, the C-5D, and the C-33, which is a military airlift version of the Boeing 747-400.[10] In addition AMC conducted the Strategic Airlift Forces Mix Analysis to compare the relative performance of a fleet of 120 C-17s against a mix of C-5D fleets and C-33 fleets in combination with fewer C-17s.[11] That study determined that certain combinations of C-17s and a mix of other airlift fleets could transport almost as much cargo to major regional conflicts as a fleet of 120 C-17s. However, the study also determined that although some mixed fleet combinations were less expensive—when they considered the constrained maximum-on-ground time conditions prevalent during Operations Desert Shield and Desert Storm—the study favored the maneuverability of the C-17.[12] Furthermore, the mixed fleet combinations could not transport as much outsized cargo as the fleet of C-17s.[13] Additionally, the mixed fleets with C-33s would require special aircraft loaders that could reach the height of the cargo floor of a 747.

Incongruity of TPFDD Planning

One challenge in establishing the requirements for strategic mobility is the difference in approaches among TPFDD planners. Combatant planners seek to minimize risk, whereas mobility planners seek to optimize all mobility assets: air, land, and sea.[14] Drawing from lessons learned, combat planners seek to minimize risk by planning to flow forces with all their equipment into theater faster by using airlift. In preparation for Operation Desert

Storm, Gen H. Norman Schwarzkopf requested and received additional military forces before initiating an offensive.[15] During that same time period Gen Charles A. Horner, as the air component commander, had to get air forces to their bases in-theater as soon as possible to defend the peninsula against an Iraqi offense while the ground force buildup continued.[16] In contrast mobility planners seek to move as much outsized and oversized equipment on sea lift because of the shortage of outsized and oversized airlift capability. During Operation Desert Shield the Army coded 65 percent of its equipment for airlift, yet this requirement exceeded AMC's capability by 300 tons per day.[17] Thus, USTRANSCOM planners rerouted some oversized and outsized cargo by sea, but a backlog of more than 10,000 tons of bulk cargo still accumulated.

Combatant Planners

In a conflict the lives of American troops are at risk. Consequently, combatant commanders seek to minimize risk that their personnel may face on the battlefield. They can achieve this by possessing enough strategic air mobility assets to airlift military forces into theater quickly in order to overwhelm or overpower the enemy. Unfortunately, mobility air forces are scarce, which places regional combatant commanders in an uncomfortable position. Further complicating the planning process, DOD separates the responsibilities of minimizing risk and the responsibilities of employing military forces. Albeit combatant commanders are responsible for minimizing risks to military forces, they are not responsible for the cost of equipping their forces or the cost to transport them. The military services and the secretary of defense control funding for new weapon systems and mobility requirements. So, combatant commanders—when developing their TPFDDs—plan for conflicts assuming that airlift is at no cost and is continually available.[18]

Mobility Planners

How quickly can strategic mobility forces transport the military forces required by the combatant commander? Mobility

plans seek to optimize mobility assets and in doing so make a number of operational assumptions. The *MRS BURU* held the six operational assumptions in establishing air mobility requirements for the two major theater war construct. The six assumptions are a rapid decision process, National Guard and Reserve activation, CRAF activation, open ports and en route bases, zero attrition during deployment, and two nonsimultaneous wars.[19]

Rapid Decision Process. As learned from the Gulf War, the keys to rapid deployments are clear warning orders from the NCA and adequate warning time to deploy. Less warning time translates to a greater need for both airlift and prepositioning in order to transport military forces into theater and halt an enemy offensive. Longer warning time enables USTRANSCOM to employ more sea-lift forces.[20] If clear intelligence identifies an enemy force preparing an offensive and the US NCA issue a warning order based on that information, then USTRANSCOM can begin the deployment process. Unfortunately, neither a clear warning order nor quick decisions were forthcoming before 4 August 1990 when Iraq was threatening Kuwait, which may challenge the reality of this assumption. Intelligence before 2 August 1990 correctly identified Iraqi troops massing on the Kuwaiti border, but this analysis viewed this as an Iraqi attempt to intimidate Kuwait into lowering its oil production.[21] As in most cases in the twentieth century, political tension preceded the invasion force; yet the Kuwaiti invasion surprised political leaders.[22] Before 4 August 1990 combatant commanders did not initiate steps for a deployment, presumably because the State Department was still seeking cooperation from the Gulf states to allow US military forces to operate in the Gulf.

Since 1990 USTRANSCOM through prepositioning has prepared combatant commanders to respond more rapidly. They activated prepositioned equipment near the Persian Gulf in several incidents in which Iraqi forces appeared to be on the move.[23] After Operation Vigilant Warrior in October 1994, the United Nations (UN) designated the 32d parallel as a no-drive zone, reinforcing the existing no-fly zone (NFZ). Thus, any in-

cursion by Iraqi forces south of the 32d parallel would serve as a sign of an offensive.

Guard and Reserve Activation. As noted, the ANG and Reserve provide 46 percent of the military airlift capability. AMC also relies on a significant number of personnel to conduct aircraft maintenance and perform aerial port duties. The Army, too, depends on reservists to perform transportation duties, initiate port operations, and load and unload ships. For sea lift, the USN relies predominantly on the merchant marines to man the Ready Reserve Force.

USTRANSCOM relies on volunteers from the Guard and Reserve even before the president activates them. To maximize the use of mobility forces, the president must activate guardsmen and reservists quickly as well as activate the merchant marines as soon as possible to get sea-lift ships under way. History shows that these forces activate too slowly to deploy and sustain forces over the first two to three weeks of a major theater war. During Operation Desert Shield the president did not activate the first Reserve airlifter units until 23 August 1990, which was 16 days after deployments were initiated.[24] In 1994, however, the president authorized a limited call-up of Reserve units for Operation Uphold Democracy within 24 hours of DOD's request. During Desert Shield, personnel shortages prevented MSC from filling some of its sea-lift crews within required times.[25] The declining number of merchant sailors raises concerns that USTRANSCOM may experience crew shortages when needed, thus delaying deployments. Furthermore, if activation occurs too slowly or too late, problems with loading and unloading could thwart the deployment into theater.

CRAF. As previously noted, the CRAF provides AMC with 50 percent of its wartime airlift capability. During Operation Desert Shield, the commander of USTRANSCOM activated stage one of the CRAF within 10 days following initial deployments. However, he was unable to persuade the secretary of defense to activate stage two until five months later; and he never requested stage three initiation. *MRS BURU,* however, assumed that AMC would employ stage two airlifters much earlier in the first war of a two-war scenario. At the beginning

of a second war, the *MRS BURU* assumed activation of CRAF stage three, which may have been optimistic in light of historical precedence.

Activating CRAF stage two upon the initiation of the first operation would increase the amount of cargo delivered. During Operation Desert Storm, CRAF cargo deliveries increased approximately 650 tons per day when the secretary of defense activated stage two.[26] During the 1990s AMC encouraged airlines to place more aircraft in both stages one and two. Based on current CRAF enrollment, activating stage two would provide 76 more passenger liners and 57 more cargo aircraft added to the numbers employed through stage one activation.

Open Ports and En Route Bases. In the *MRS BURU*, mobility planners assumed that mobility forces would incur no attrition at either airports or seaports of debarkation because those ports would operate in an environment where friendly combatant forces held naval and air superiority.[27] AMC employs foreign nation support to refuel airlifters and change aircrews en route because of the distances to either theater of operations. During Operations Desert Shield and Storm, Zaragoza Air Base (AB), Spain, and Torrejon AB, Spain, in conjunction with Rhein–Main AB, Germany, handled 61 percent of US airlift traffic.[28] AMC's en route structure decreased from 39 locations in 1991 to 12 locations in 1999.[29] The air mobility system operates better when airlifters can land at en route bases because aircrews can rest while replacement crews deliver the cargo to theater and then return the aircraft to the original crew for a follow-on mission. When the number of aircrews is limited, the lack of en route bases reduces strategic airlift capacity by 20 to 25 percent[30] because aircrews are limited as to how many hours they can fly during a given period.[31] Thus, the en route infrastructure examined in chapter 4 is a critical element of force structure requirements; and constraints on access to aerial ports, seaports, or the air mobility en route infrastructure will delay TPFDD execution.

Zero Attrition. This assumption lies in the belief that friendly forces will gain and maintain air and sea superiority during the buildup phase of hostilities. The combat assets needed to perform air superiority, however, require mobility

assets to put them in place. During Operation Desert Shield, Iraqi forces remained inactive during the coalition forces buildup. The *MRS BURU* assumes that future adversaries will allow the same buildup. Yet, rarely does an adversary permit an uninterrupted buildup of aggressive forces against itself.

Nonsimultaneous Wars. For the United States to prosecute two wars, they would have to begin between one and three months apart.[32] Shortfalls in tanker support and in airlifters would prevent the United States from prosecuting a second war successfully if the second occurred within three weeks of the first.[33] Sea-lift requirements would also be insufficient if USTRANSCOM had to move equipment to two major theater wars simultaneously.[34] Without enough time between the two wars, USTRANSCOM might not be able to regenerate and transfer prepositioned equipment. Thus, simultaneous wars would have a significantly negative implication for mobility requirements.

To maintain a moderate risk for military forces, AMC must transport 60 to 70 percent more cargo during the first three weeks of a second war than it transported during the first month of Operation Desert Shield. This proposition emanates from one of the most demanding scenarios depicted in *MRS BURU*: sustaining operations in Korea while transporting equipment to halt an invasion in the Persian Gulf region.

The *MRS BURU* estimated the transportation of 5,000 tons daily to an initial operation in Korea during the first 30 days and 5,000 tons daily during the first 15 days to the second operation in the Persian Gulf. These estimates are based on the immediate use of CRAF stage two aircraft. In comparison to Operation Desert Shield, USTRANSCOM transported 1,700 tons daily during the first month and 3,600 tons daily during its peak, which was January 1991. The two major theater wars scenario, assumed to be nonsimultaneous, requires far more airlift than was available during Operation Desert Shield.

Air Mobility Planning

Air Command and Staff College at Maxwell Air Force Base (AFB), Alabama, excludes mobility planning from its curricu-

lum, which centers on planning air campaigns and target selection.[35] One explanation of this exclusion is the fact that airlift and sea-lift crews often provide transportation for Army troops rather than supporting their own military service. Both airlift and sea lift have become the orphans of military planning within the Air Force and USN, where mobility advocates of both services continually lose institutional battles for funding.[36] Note that service education emphasizes the cutting edge and gives logistics fairly short shrift.

Consensus Planning

Mobility coordination incorporates views from the JCS, the military services, the secretary of defense, USTRANSCOM, and the regional CINCs. These organizations look at the different modes of lift and decide how to allocate resources. These organizations produce decisions through a committee process, which is a consensus that provides something to each organization.[37]

Airlift Options

The *MRS BURU* developed scenarios based on the assumptions above. That raises questions because of evidence raised in chapters 2 and 3.[38] The *MRS BURU* developed scenarios to achieve rapid global mobility to sequentially halt each enemy advance and then initiate the respective counteroffensives.[39] Some analysts believe that the *MRS BURU* ignores the question: How can the risk faced by military forces that arrive in-theater first be reduced?[40] The *MRS BURU,* however, identified operational effects and the increased risk assumed under different air mobility options.[41]

The cost of airlift options centered on the number of C-17s in a given fleet, which demonstrated correlation between an increase in MTM/D with the increase in the number of C-17s.[42] Thus, the *MRS BURU* seemingly proceeded along the assumption that more airlift available to transport military forces translates into reduced risk incurred by those forces. The result recommended the modernization of mobility air forces with the C-17. The option recommended by the admin-

istration was to acquire the smallest possible number of C-17s. Congress funded this recommendation. In an attempt to reduce the risk inherent in this option, USTRANSCOM increased the amount of prepositioned equipment within USCENTCOM's theater, which carries a smaller price tag than an increased fleet of C-17s.

En Route Infrastructure

Both the *MRS BURU* and the Strategic Airlift Forces Mix Analysis examine acquisition of the C-17. Neither the C-17 alone nor the C-17 in combination with prepositioning equipment can achieve the rapid global mobility necessitated in DOD mobility requirements. En route infrastructure also facilitates mobility, both domestically to bring military forces to ports of debarkation within the United States and at ports of embarkation within each theater, in order to bring forces in smoothly. During Operation Desert Storm, both airports and seaports in Saudi Arabia had backlogs because there were too few trucks—25,000-pound and 40,000-pound loaders—to unload cargo and passengers.[43] These bottlenecks caused an accumulation of huge amounts of equipment and troops that provided the enemy with an attractive target.[44] Thus, it is important to have the necessary loading and unloading equipment to move passengers and cargo within a theater and ensure that mobility forces that operate seaports and airports arrive first.

Intelligence Is Critical

Knowing the characteristics of ports and airfields worldwide enables planners to consider how many passengers and how much materials and equipment can transit through a given port each day. Knowing the capabilities of the enemy as well as the capabilities of any groups that might desire to thwart US mobility operations—to include threats such as chemical or biological weapons—also provides planners with risk estimates.

Improved intelligence gathering in support of USTRANSCOM would have helped to smooth mobility operations.

During Operation Desert Shield the electronic management system used by theater commanders to coordinate their deployment priorities experienced frequent gridlock.[45] Some of the system's users were unfamiliar with it; others found it so cumbersome that they circumvented it by sending messages for airlift missions direct to AMC. As combatant commanders changed deployment schedules, many airlifters took off before units were ready to deploy; and aircraft took off in response to a combatant commander's calls for specific aircraft that were the wrong type of airlifter for the cargo load.[46]

Further compounding the problem was USTRANSCOM's poor means of tracking cargo loads and passengers. Without that information, combatant commanders reordered equipment and supplies, thus placing even greater demands on the mobility system.[47] Additionally, many containers were without labels; and as port operators held them until they could verify the contents, a backlog grew.

USTRANSCOM modernized its information systems with its GTN that is easy to use for both mobility forces and combatant forces. Part of this system includes bar codes on all equipment and containers while in transit. Nevertheless, experts still believe that USTRANSCOM's system for managing information could better facilitate adjustments to mobility plans more quickly as tactical conditions changed.[48]

Requirements of Four Scenarios

The *MRS BURU* published in 1995 had a dual focus. On one hand, it used computer simulations of combat and deployments to estimate the number of airlifters, ships, and prepositioning sites that USTRANSCOM needed to meet specific deployment timelines. On the other hand, it had to constrain its analysis to be affordable.[49] Thus, the *MRS BURU* tried to quantify how much risk military forces would incur while achieving military objectives and constraining the cost.

The *MRS BURU* proposed four scenarios. The first scenario was a single operation in Korea. The second scenario was a single operation in the Persian Gulf. The third scenario was a war in Korea followed by a war in the Persian Gulf. The fourth

scenario was a war in the Persian Gulf followed by a war in Korea. The *MRS BURU* identified the heaviest mobility requirements in the second and third scenarios. In the first situation, the *MRS BURU* foresaw a shortfall in the lift requirement to transport enough forces to halt an offensive and maintain a moderate risk. The study recommended resolution of the shortfall either by purchasing additional airlift planes or by prepositioning additional cargo in the region. The total tonnage of cargo required is classified, but according to unclassified accounts that shortfall is small enough to fall within the margin of error of the models used to estimate those requirements.[50]

Prepositioning

The *MRS BURU* recommended prepositioning more heavy Army equipment and materials to make up for the shortfall that would exist in a single major theater war. In the third and fourth scenarios, however, the *MRS BURU* cites a challenge to prepositioning. If the Army uses the prepositioned equipment for the halt phase in the first war, that equipment would be unavailable for the halt phase of the second war. USTRANSCOM must preposition enough equipment in both theaters or regenerate the prepositioned ships after unloading the equipment in the first theater of operations. In the latter circumstance, USTRANSCOM would have to regenerate the prepositioned ships and send them back to the United States to pick up a new set of equipment for the halt phase of the second war.

Airlift

The *MRS BURU* recommended the acquisition of enough airlifters to transport between 49.4 and 51.8 MTM/D. The exact amount of MTM/D depends on the amount of prepositioned equipment. If USTRANSCOM can preposition enough equipment, 49.4 MTM/D would suffice to airlift the remaining cargo required for the halt phases of two major theater wars with an acceptable risk. However, if USTRANSCOM cannot preposition more forces or if the Army's afloat prepositioning is not held in

reserve for a conflict in the Persian Gulf, this study's author believes more airlift is advisable. According to the *MRS BURU,* the acquisition of 120 C-17s would provide USTRANSCOM with the 49.4 MTM/D of airlift capability required. In addition, that study suggested that to achieve a higher level of airlift capability, the Air Force would have to acquire more C-17s. Based on the *MRS BURU,* the Army examined what additional equipment to preposition. Consequently, from the Army's examination, USTRANSCOM increased the requirement for airlift capability to 49.7 MTM/D, of which the CRAF would produce 23.2 MTM/D.[51]

Sea Lift

The *MRS BURU* concurred with a 1992 mobility requirements study that recommended two acquisitions to modernize sea-lift capabilities. The first acquisition was for 19 large medium-speed roll-on/roll-off (LMSR) ships, some of which USTRANSCOM could use to preposition equipment. The second acquisition was to establish a fleet of 36 smaller roll-on/roll-off ships for the Ready Reserve Force. Once the USN acquired these, they could remove several older break bulk ships from the Ready Reserve Force. The *MRS BURU* also recommended relying on the commercial shipping contracts to sustain supplies in both theaters, estimating a requirement for 6,000 to 6,500 20-foot-equivalent containers per week to carry cargo, plus 13 to 16 containerships to deliver ammunition.

Cost

Airlift is the most expensive of the three options but provides the most rapid means for global mobility. Consequently, the decision is twofold. The first question: What forces must move rapidly for immediate use versus what military forces can follow on later? The second question refers to those military forces that must move rapidly: What equipment must USTRANSCOM preposition versus what they must airlift? Concerning the first question, a decision that requires fewer rapid-reaction forces and more follow-on forces increases the cost to the USN and reduces the cost to the USAF. Concerning the second question, a decision that requires more prepo-

sitioned Army equipment and fewer airlifters raises the cost to the Army and lowers the cost to the Air Force.

From this line of thinking, additional questions are raised as to what options the services support. For example, the Air Force may support the prepositioning of equipment because it reduces its cost; and if it has other priority aircraft to acquire, the Air Force can pursue them rather than acquiring more airlifters.

Halt Phases

How quickly can mobility forces transport cargo in each scenario? Sea lift would transport the first military forces within three weeks to halt an enemy attack in the Persian Gulf.[52] The halt phase places the greatest demands on airlift and prepositioning. The halt phase of a second theater war, if overlapping the first theater war, would challenge USTRANSCOM's airlift capacity beyond its capability. USTRANSCOM would have to transport heavy units to the second theater while transporting cargo to sustain operations in the first theater. The director of operations and logistics for USTRANSCOM, then Maj Gen Charles Coolidge, stated, "We have a one-major-theater-war force to fight a two-major-theater-war strategy."[53]

Airlift Capability

Another important measure of capability is the amount of outsized cargo that the operations of two major theaters require in wartime. The current airlift capacity is 11 percent short of the minimum requirement of 49.7 MTM/D established by *MRS BURU*.[54] AMC's actual total capacity is 43.9 MTM/D, which is a 5.8 MTM/D shortfall.[55] CINCTRANSCOM, Gen Charles T. "Tony" Robertson Jr., cited three major causes for the shortfall. First was the C-5 reliability, where 2.7 MTM/D of this shortfall is due to the low C-5 mission capable (MC) rate, which equates to about 50 percent of the total shortfall.[56]

The second reason for the airlift capacity shortfall was the C-141 drawdown. The *MRS BURU* made its 49.7 MTM/D rec-

ommendation based on the number of aircraft in the C-141 fleet remaining the same. When AMC accomplished this study in 1994, all C-141s were undergoing repairs to lengthen the fleet's service life.[57] Since then, AMC accelerated the retirement of the C-141 fleet due to airframe fatigue that the depot cannot repair. Consequently, the number of C-141s in the fleet decreased from 249 following Operation Desert Storm to 74 as of 18 October 1999 (fig. 2).[58]

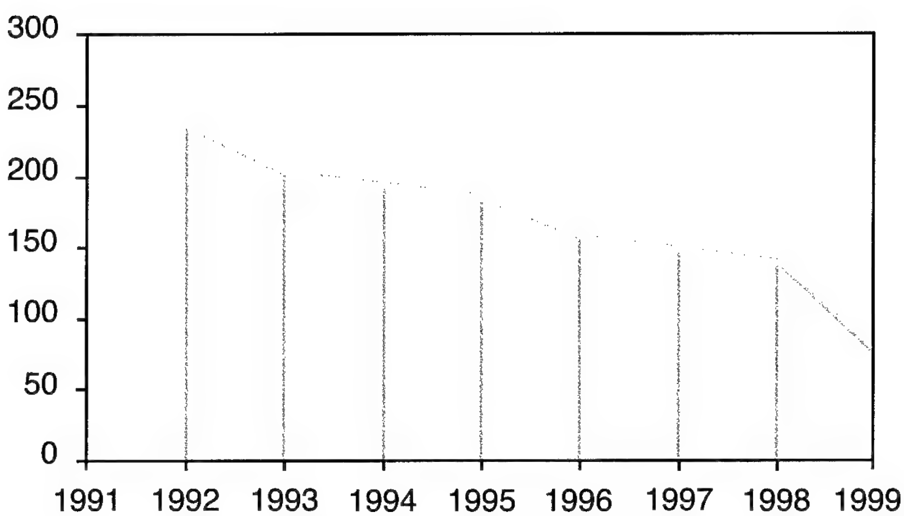


Figure 2. C-141 Drawdown

The third reason for the shortfall was the fact that the increasing operations tempo of the mobility air forces outpaces the C-17 acquisition program. During fiscal year 1994, when the JCS accomplished the *MRS BURU*, the operations tempo of the mobility air forces rose approximately 20 percent.[59]

Changing TPFDD Schedules

The planning of the Gulf War provides an example. In the fall of 1989, General Schwarzkopf, then CINCCENTCOM, began revising military plans to prepare against a possible Iraqi offensive into Kuwait and/or Saudi Arabia.[60] His TPFDD

was incomplete when Iraqi forces invaded Kuwait on 4 August 1990. USCENTCOM planners drew up an operational plan amidst a rapidly changing situation.

Today, combatant planners develop operational plans for several possible contingencies in order to be prepared when an enemy initiates an offensive. This lengthy process can take more than a year to complete. Unfortunately, planners are unable to anticipate every contingency; and armed conflicts usually follow a script other than planned. Combatant commanders might prefer that the Air Force acquire enough mobility air forces to give them flexibility in changing their TPFDD schedules to stay ahead of changing situations.

Prepositioning and sea-lift options constrict a combatant commander's flexibility because he needs to select which units to preposition long before any armed conflict occurs—whereas a larger mobility air force would provide more flexibility to make last minute changes that would enable a combatant commander to stay ahead of the enemy. Thus, mobility air forces provide the flexibility that a combatant commander needs to improve his chances of halting an enemy offensive while incurring less risk to friendly military forces.

Risks to Friendly Forces

The *MRS BURU* assumed that deployments would occur in a secure environment. Since USTRANSCOM would move so many forces to a theater after an enemy attack, that enemy would have a strong incentive to slow deployments by targeting seaports and airports. An enemy could also mine ports; destroy runways; hit airport and seaport facilities, planes, and ships; and employ special operations forces. As more countries continue to develop longer-range missiles, an enemy could target airports and seaports with chemical, biological, or nuclear weapons as well.

Mobility forces would be more vulnerable using sea lift than airlift. Prepositioned ships and sites, as well as LMSRs, carry more equipment and materials than does an airlifter. If the enemy destroyed a prepositioned ship or site or an LMSR, a greater percentage of war-fighting material would be lost than

if the enemy destroyed an airlifter. Additionally, if the enemy destroyed a runway or airport, the flow of cargo would simply divert to an alternate airport. Seaports provide lucrative targets versus airports because of the large volume of cargo that a ship unloads. A lack of suitable ports could complicate a deployment dependent on sea lift. During Operations Desert Shield and Desert Storm, USTRANSCOM transported 96 percent of sea-lift cargo to just two ports; and five airports across the Arabian Peninsula received 78 percent of airlifted cargo.[61] Sea lines of communication and choke points are more vulnerable than ALOCs and en route airports. If sea-lift ships deploying to the Persian Gulf were unable to transit the Suez Canal, the trip around Africa would add a week to TPFDD schedules. Conversely, airlifters can divert around a hostile area, if needed, in a matter of minutes or hours. However, if friendly naval forces control the sea in those areas needed for sea-lift transit, sea lift becomes the most cost-advantageous means of cargo deployment. The current CINCTRANSCOM identifies the risk level of forces flowing into a major theater war as medium to high, whereas the *MRS BURU* sought to establish a low risk level.[62]

Two Important Factors

In examining the force structure requirements for AMC, two important factors emerged. First, this evaluation of the two major theater wars scenario identified shortfalls in the required airlift capability. The minimum requirement for airlift is not currently available in accordance with force structure requirements established. Second, this chapter pointed out that the risk to friendly forces during the deployment to two theaters of operation is higher than combatant commanders would like, and increasing airlift could reduce that risk. Due to reduced airlift capacity, DOD estimates the current level of risk at medium to high.

Notes

1. US Congress, *Moving US Forces: Options for Strategic Mobility* (Washington, D.C.: Congressional Budget Office, February 1997), 46.

2. US Congress, *Military Airlift: Options Exist for Meeting Requirements While Acquiring Fewer C-17s* (Washington, D.C.: General Accounting Office, February 1997), 59.

3. US Congress, *Moving US Forces,* 46.

4. Dr. Eliot A. Cohen, *Gulf War Air Power Survey,* vol. 3, *Logistics and Support* (Washington, D.C.: Government Printing Office, 1993, 75.

5. Department of Defense (DOD), *Mobility Requirements Study Bottom-Up Review Update (MRS BURU)* (Washington, D.C.: Joint Chiefs of Staff [JCS], 28 March 1995), Introduction, I-2.

6. David Kassing, "Strategic Mobility in the Post-Cold War Era," in *New Challenges for Defense Planning,* Paul K. Davis, ed., MR-400-RC (Santa Monica, Calif.: RAND, 1994), 671.

7. Joint Publication 3-35, *Joint Deployment and Redeployment Operations,* 7 September 1999, III-30.

8. US Congress, *Moving US Forces,* 46.

9. Ibid., 16.

10. DOD, *MRS BURU,* Annex C, c-1.

11. Ibid.

12. US Congress, *Military Airlift,* 19.

13. Ibid., 20.

14. DOD, *Report of the Defense Science Board Task Force on Strategic Mobility* (Washington, D.C.: Office of the Undersecretary of Defense for Acquisition and Technology, August 1996), 11.

15. Thomas A. Keaney and Eliot Cohen, *Revolution in Warfare? Air Power in the Persian Gulf* (Annapolis, Md.: Naval Institute Press, 1995), 4.

16. Ibid., 3.

17. James K. Matthews and Cora J. Holt, *So Many, So Much, So Far, So Fast: United States Transportation Command and Strategic Deployment for Operation Desert Shield/Storm* (Washington, D.C.: JCS, May 1996), 84–87.

18. Kassing, 679–80.

19. DOD, *MRS BURU,* 2–3.

20. "U.S. at 'High Risk' of Being Unable to Carry Out Two-War Strategy until 2006," *Inside the Pentagon,* 22 September 1994, 1–6.

21. Michael R. Gordon and Bernard E. Trainor, *The Generals' War: The Inside Story of the Conflict in the Gulf* (Boston: Little, Brown & Co., 1995), 14–20, 26.

22. Richard K. Betts, *Surprise Attack: Lessons for Defense Planning* (Washington, D.C.: Brookings Institution, 1982), 18.

23. David Kassing, *Army and Marine Corps Prepositioning Programs: Size and Responsiveness Issues,* PM-378-CRMAF (Santa Monica, Calif.: RAND, April 1995), 25.

24. John Lund, Ruth Berg, and Corinne Replogle, *Project AIR FORCE Analysis of the Air War in the Gulf: An Assessment of Strategic Airlift Operational Efficiency,* Report no. R-4269/4-AF (Santa Monica, Calif.: RAND, 1993), 30–31.

25. Thomas McCaffery, *Ready Reserve Force Contingency Crewing Requirements Study* (Alexandria, Va.: McCaffery and Whitener, 15 December 1995), ES-1.

26. Lund, Berg, and Replogle, 13.

27. DOD, *MRS BURU,* 3.

28. Lund, Berg, and Replogle, 81–82.

29. Air Mobility Command (AMC), *Air Mobility Strategic Plan 2000*, Infrastructure (Scott Air Force Base [AFB], Ill.: Directorate of Plans and Programs, November 1999).

30. Lund, Berg, and Replogle, 31–35.

31. Aircrews are limited to flying a maximum of 16 hours per day, 125 hours per 30 days, and 330 hours over 90 days. During Desert Shield those limits were raised to 18 hours per day, 150 hours per month, and 400 hours per 90-day period due to aircrew shortages in air mobility aircraft to include both tankers and airlifters.

32. Michael E. O'Hanlon, *Defense Planning for the Late 1990s: Beyond the Desert Storm Framework* (Washington, D.C.: Brookings Institution, 1995), 7.

33. Christopher Bowie, *The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns*, Report no. MR-149-AF (Santa Monica, Calif.: RAND, 1993), ix.

34. DOD, *MRS BURU*, I-2.

35. Several Air Command and Staff College (ACSC) curriculum sources show no course on mobility. In all courses and exercises, mobility is assumed to be available in sufficient quantity to perform the operation. Sources include the 1999 ACSC in-residence curriculum, the ACSC 1999 Cyberbook, and the 1997 ACSC Distance Learning curriculum.

36. US Congress, *Moving US Forces*, 49.

37. Kassing, "Strategic Mobility in the Post-Cold War Era," 688.

38. DOD, *MRS BURU*, 2–3.

39. Ibid., I-2.

40. Owen Coté Jr., *Strategic Mobility and the Limits of Jointness*, Center for Science and International Affairs monograph (Cambridge, Mass.: Harvard University Press, 1998), 4–11.

41. DOD, *MRS BURU*, 3.

42. Ibid., sec. 5, table V-1.

43. Lt Gen William G. Pagonis, *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War* (Boston, Mass.: Harvard Business School Press, 1992), 46–47.

44. DOD, *Report of the Defense Science Board Task Force on Strategic Mobility*, 56.

45. Matthews and Holt, 21–22.

46. Ibid.

47. Ibid., 27.

48. James K. Matthews, *General Kross, Commander in Chief United States TRANSCOM and Commander Air Mobility Command: An Oral History* (Scott AFB, Ill.: US Transportation Command [USTRANSCOM], October 1999), 67–71.

49. DOD, *MRS BURU*, 2.

50. Elaine M. Grossman, "OSD Debates How to Explain Military's Difficulty with Two-War Strategy," *Inside the Pentagon*, 26 January 1995, 1–10.

51. US Congress, *Moving US Forces*, 52.

52. Ibid.

53. Bryant Jordan, "Overloaded; Can the Airfleet Handle Two Wars at Once? By All Forecasts, No," *Air Force Times*, 30 August 1999, 14.

54. *Defense Transportation Journal*, June 1999, 26. During the US Senate Strategic Lift Hearing in March 1999, commander in chief of US-

TRANSCOM, Gen Charles T. "Tony" Robertson Jr., responded to committee chairman, Sen. James M. Inhofe's (R-Okla.) question by noting an 11-percent shortfall in meeting the 49.7 MTM/D.

55. Col Michael Fricano, "Future Directions of Air Mobility," *Mobility Requirements Study 05.* Slide presentation at the December meeting of the Maxwell chapter of the Airlift Tanker Association, 13 December 1999, 5.

56. Ibid.

57. AMC, *1998 Air Mobility Master Plan: Rapid Global Mobility* (Scott AFB, Ill.: Directorate of Plans and Programs, October 1997), 5-18–5-22.

58. Department of the Air Force, *United States Air Force Statistical Digest, Fiscal Year 1996* (Washington, D.C.: Assistant Secretary of the Air Force for Financial Management and Comptroller, 1997), 94; and *Air Mobility Command, Command Data Book* (Scott AFB, Ill.: AMC, Quality and Management Innovation Flight, November 1999), 11.

59. James Kitfield, "Airlift at High Tempo," *Air Force Magazine*, January 1995, 59.

60. Matthews and Holt, 19.

61. DOD, *Report of the Defense Science Board Task Force on Strategic Mobility,* 56.

62. Jordan, 14.

Chapter 4

Current Force Structure

We have learned and must not forget that from now on air transport is an essential element of airpower, in fact, of all national power. We must have an air transport organization in being capable of tremendous expansion.

—Gen Henry H. "Hap" Arnold, 1945

AMC's actual total capacity is 43.9 MTM/D, which is a 5.8 MTM/D shortfall of the two major theaters wars construct.[1] To understand how the force structure translates into airlift capability, it is important to know the factors involved in determining the MTM/D measurement to include aircraft utilization rates and cargo classifications. Next, it is important to understand the MC rates of the major AMC airlift and tanker airframes in order to explain why the force structure of AMC achieves only 43.9 MTM/D. Finally, an examination of AMC's en route infrastructure will identify additional force structure limits in the throughput of passengers and cargo.

AMC measures airlift capacity as MTM/D, which allows for quick comparisons. The formula for determining MTM/D is the mathematical product of four factors: objective utilization rate, blockspeed, payload, and productivity.[2] The first factor, the objective utilization rate, is the average flight hours per day flown by aircraft in primary aircraft authorization (PAA) in service assigned to flying squadrons. The second factor, blockspeed, is the average ground speed in nautical miles (NM) per hour from takeoff to a block distance of 2,500 NM. AMC bases the third factor, payload, on the average payload per aircraft as experienced during both Operations Desert Shield and Desert Storm. The fourth factor, productivity, takes into account the aircraft returning from its offloading location to its next onloading location, which varies depending on the distances to these locations.

Unfortunately, several factors are too circumstantial to consider when determining MTM/D calculations. These wide-

ranging factors include timing restrictions, unit integrity for air mobility flying squadrons, system interactions, infrastructure constraints, and the differences between cargo classifications. The most important factors in understanding the limits of airlift capability are aircraft objective utilization rates and cargo classifications.

Calculations for objective utilization rates encompass many characteristics. Each aircraft has two objective utilization rates: surge and sustained. Surge is the first 45 days of an operation, and sustained is the time period from when surge ends until operation termination.[3] After the surge rate ends, the flying rate decreases to the sustained rate in order for maintenance personnel to perform repairs and conduct aircraft inspections.

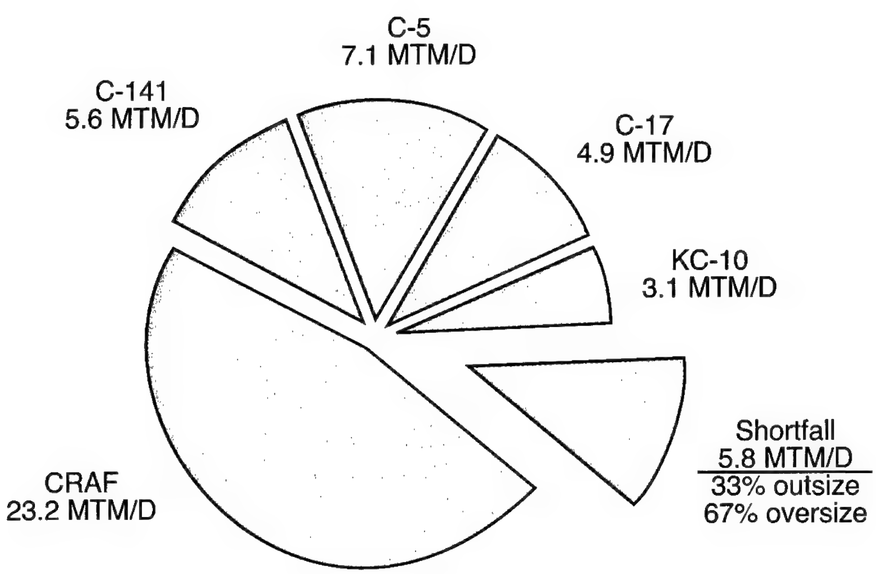
Other characteristics also define objective utilization rates. AMC assigns each type of airframe an objective utilization rate based on the fleet characteristics of that aircraft and aircrew employment per aircraft. To determine fleet characteristics, AMC calculates reliability, maintainability, performance, ground handling, and loading characteristics of each type of airframe. To compute aircrew employment per type of airframe, AMC uses only 86 percent of the total number of aircrews trained and qualified for flying duty because 14 percent of aircrews are on temporary duty (TDY) assignments, ill, or on leave.[4] Further restricting aircrew use, Air Force regulations limit aircrew flying hours to only 150 hours in a 30-day period and 400 hours in a 90-day period. Aircrew employment factors also assume a 25 percent volunteer rate among ANG and AFRes components. Furthermore, objective utilization rates depend on several characteristics to include location, en route support capabilities, air traffic control restrictions, ramp space, crew ratio, and component makeup of the force structure.

Cargo Classifications

AMC employs three classifications due to size characteristics of loads, which limits the choice of airframes available to transport classifications of cargo as the size increases. The first classification, bulk cargo, is general cargo loaded onto

standard size pallets (108 inches by 8 inches) or into containers. A number of different airframes, including both military and commercial aircraft, commonly transport bulk cargo. The second classification, oversized cargo, is larger than bulk but less than outsized cargo. Two criteria define oversized cargo: palletized with an extended height of 96 inches or cargo with maximum dimensions of 105 inches in height, 109 inches in length, and 117 inches in width.[5] Currently, the only aircraft capable of carrying oversize cargo are the C-5, C-17, C-141, KC-10, and C-130.[6] The third classification, outsize cargo, exceeds the dimensions of oversized cargo and requires either a C-5 or C-17 for transportation. Due to aircraft availability restrictions on larger cargo classifications, they play an essential role in determining whether AMC meets its mobility objectives.

Two cargo classifications make up the 5.8 MTM/D shortfall: 33 percent outsize and 67 percent oversize (fig. 3). This situation occurs because of the restricted cargo capabilities of the airframes at AMC's disposal and limited number of airframes



Source: AMC/XP

Figure 3. 49.7 Million Ton Miles Per Day

capable of transporting outsize and oversize cargo. The director of plans and programs for AMC airlifters has divided the airlift fleet into three categories. The first category includes both the C-17 and the C-5 because they are capable of carrying bulk, outsize, and oversize cargo. The second category includes both the C-141 and KC-10 because they are capable of carrying bulk and oversize cargo. The third category includes commercial aircraft because they can only carry bulk cargo due to their low wings, high bodies, and small doors.[7]

Mobility Aircraft

Total airlift capability at the 43.9 MTM/D level requires all components to perform, where CRAF members provide 50 percent of airlift capability through contracts. The ANG and the AFRes conduct an additional 23 percent of airlift capability, and active duty forces perform the remaining 27 percent of airlift capability.[8]

As noted in chapter 2, AMC's capability to achieve the *MRS BURU* objective of transporting 49.7 MTM/D falls short. The main reason for this shortfall boils down to a lack of mobility airframes. AMC expects a decrease in the number of airlifters in service. During Operations Desert Shield and Desert Storm, USTRANSCOM relied on nearly 350 military airlifters; and as of 18 October 1999, AMC's PAA for airlifters was only 273.[9] AMC also experienced a reduction of tankers in service. In 1991 Strategic Air Command (SAC), who owned all tankers at that time, had a PAA of 648 tankers.[10] In 1992 all tankers were subsequently transferred to AMC, and by 1999 the PAA for tankers was down to 474 tankers, of which 50 percent transferred to the AFRes. Aircraft MC rates are a primary factor in calculating MTM/D. In fiscal year 1997, the MC rate for AMC was 66 percent; and for the first quarter of fiscal year 1998, logistics data shows an MC rate of about 63.5 percent.[11] A closer examination of each fleet brings this concept into focus.

C-141 Fleet

The C-141 fleet is the backbone of strategic airlift, yet it only contributes 5.6 MTM/D of the *MRS BURU* objective of 49.7

MTM/D. A fleet of 266 C-141 airlifters transported cargo during Operations Desert Shield and Desert Storm.[12] The C-141 can transport 13 pallets a distance of 3,130 NM; and when aerially refueled, it can fly anywhere in the world.[13] Unfortunately, the C-141 has reached the end of service; and the fleet's retirement is in progress and scheduled for completion by 2006.[14]

C-5 Fleet

In a fully loaded configuration, the C-5 can transport 36 pallets and 73 passengers but requires aerial refueling to go beyond its fully loaded range of only 830 NM.[15] However, with aerial refueling the C-5 should transport 13.2 MTM/D at the required 75 percent MC rate. However, the fleet's MC rate declined from 71 percent in 1992 to 59.4 percent, which results in a 7.07 MTM/D average.[16] Thus, MC rates of a fleet of airframes directly affects MTM/D capability. Nearly 50 percent of the previously mentioned MTM/D shortfall, 2.7 MTM/D, resulted from the C-5's poor MC rate. Unfortunately, because of the declining C-5 MC rate, this shortfall will continue to exist if AMC does nothing.

To improve the performance of the C-5 fleet, AMC proposed a C-5 Reliability Enhancement and Reengineering Program that includes—among numerous other items—engine replacement. The new high-pressure turbine engines will work to 2,500 hours, which is more than twice the current engine life of 1,200 hours. In addition, the enhancement program would increase the MC rate to 75 percent. A C-5 review team—consisting of members from the National Aeronautics and Space Administration, the Federal Aviation Administration, and the Air Force—concluded that due to the structural integrity of the C-5 airframe, its service life could last until 2040 with proper fleet management.[17] AMC projects that the cost savings of the C-5 enhancement program, as compared to the purchase of a new airframe, will be $4.4 billion when spread over the projected life cycle of the fleet.[18]

C-17 Fleet

The growing C-17 fleet will become the new backbone of airlift for AMC.[19] The C-17 contributes 4.9 MTM/D to the total

airlift capability.[20] The *MRS BURU* relied on the Strategic Airlift Forces Mix Analysis, conducted by AMC, for its recommendation of 120 C-17s to meet air mobility requirements.[21] Unfortunately, this recommendation excluded consideration of the airlift requirements for special operations that calls for 15 additional C-17s.[22] Also noteworthy is the fact that AMC originally sought 210 C-17s.[23]

The C-17 has a 90 percent MC rate, with the capacity for 18 pallets or 102 passengers that will eventually provide approximately 14 MTM/D once all 120 are in service.[24] As additional C-17s enter service in PAA billets among different squadrons, the outsized and oversized cargo shortfall should subside.

The C-17 has range limitations because development was a compromise. By building an aircraft with a footprint of the C-141 that could carry outsized cargo, the USAF sacrificed range. Thus, the C-17 has short range for a strategic airlifter, which makes it very tanker intensive when fully loaded. To resolve this situation, AMC proposed adding extended range tanks that would provide an additional 67,000 pounds of fuel in an added center-wing fuel tank. This new tank will add range to the C-17, which in turn will reduce the C-17's dependency on tanker support or en route refueling stops. The C-17 system program director feels that current program funds can absorb the modification cost. If the program director is correct, deliveries of aircraft with the new tanks could have begun in July 2001. The additional fuel tank will consequently reduce the C-17's need for tanker assets which, as explained later, relieves the overburdened tanker fleet.

Another C-17 limitation is its inability to perform direct delivery on a continuous basis on a dirt runway. C-17s can direct deliver to a concrete runway on a continuous basis, but can deliver cargo to a dirt runway only once, maybe twice, because of the physical properties of dirt.[25] After the first landing, the landing wheels of the aircraft cut into the surface of the airstrip. The next aircraft landing cuts more ruts into the surface and so on until the airstrip is finally too torn up to land on. However, the C-17 can provide continuous flow using concrete-capped runways, which the Army Corps of Engineers can build within days and at little cost.[26]

A proposal by the Boeing Company seeks to increase the total number of C-17s from 120 to 180. This proposal would incur a new multiyear procurement contract that would give longevity to the production line of C-17s. This increased production would reduce the manufacturing cost of the C-17s purchased under the proposed new contract to approximately 75 percent of the C-17's current 80 aircraft acquisition program.[27] The lower price of $149 million per aircraft hinges on a 15 aircraft per year production rate. The acquisition program does not take advantage of lowest cost per aircraft production, which is 15 aircraft per year.

C-130

The C-130 is AMC's core intratheater airlifter and comprises the Air Force's most variant fleet with 21 different models and variants within the fleet, which creates several problems.[28] First, the Air Force must provide funding to support what totals 45 different configurations among the 21 variants of the fleet. Second, AMC relies on Air Education and Training Command to provide basic C-130 training to its crews in C-130Es. Following C-130 basic training, specific units must conduct excessive in-unit training in order to account for all the differences between the aircraft, which creates an abnormally large training bill for those units.

The third problem is a lack of interoperability. For example, a crew member that flies a C-130E cannot fly a C-130H3 because they are different aircraft. Sixty-three percent of the fleet is in the ANG and the AFRes. When a mix of active duty, Guard, and Reserve forces support an operation, they form rainbow units at their deployed location, which results in manning and scheduling problems. Differences in equipment types cause crew qualification differences that create a situation where C-130 crews are not interchangeable. Thus, the differences influence operational effectiveness of the force, which constrains the theater commander's operation. Furthermore, each type of aircraft requires unique maintenance, unique mobility readiness spares package kit construction, and unique support equipment.

The C-130 fleet is also an older fleet that requires upgrading. Ninety-three percent of the active duty aircraft were built before 1978, 69 percent of the ANG aircraft were built after 1978, and 74 percent of the AFRes aircraft were built after 1982. Support for this aging fleet is increasing at 17 percent annually. In addition, mandated navigation and safety requirements drive the need to update avionics.

AMC is seeking procurement of two additional models—the C-130X and the C-130J. Large-scale production of the C-130X would reduce the number of variants in service. Production of the new J-model will provide improved C-130 performance, which will provide improved capabilities over the current C-130E model. The J-model will have the option to carry two more pallets, 23 more medical litters, 36 more combat troops, or 28 more paratroopers than the C-130E model. By 2013 AMC desires only two primary avionics configurations: the C-130X and the C-130J. Special operations aircraft may share common avionics with the C-130X and have additional equipment for their specialized missions.

KC-10 Fleet

The KC-10 is AMC's newest fleet of aircraft, where the average age of the fleet is 16 years.[29] The KC-10 is a modified DC-10 commercial aircraft, which can carry a maximum cargo weight of 55 tons on 27 pallets; and its maximum load carrying capability is 170 tons, which could be all fuel or fuel and cargo combined.[30] As is the case with commercial aircraft, the KC-10 requires special loading equipment to lift cargo high enough to reach the floor of the aircraft. Out of 54 KC-10 aircraft, AMC plans to augment its airlift fleet with 37 of them during a single theater war, contributing 3.1 MTM/D to the total airlift capacity.[31] Thus, only 17 KC-10s will be available as tankers during a major theater war, where the operations tempo would dictate a need for more tankers.

KC-135 Fleet

The KC-135's primary mission during the Cold War was the aerial refueling of SAC's armada of nuclear bombers, and it is

still the backbone of aerial refueling. At the end of the Cold War, a 1991 SAC study showed the projected reduction in requirements for aerial refueling. The study acknowledged the reduction in the number of bomber and fighter aircraft due to the projected drawdown.[32] However, because the United States has the only substantial aerial refueling capability, the study did not address the need for aerial refueling for airlifters nor the increasing requirement for aerial refueling for NATO aircraft. Unfortunately, the 1991 SAC study led to two decisions about the KC-135 fleet. First, the Air Force withdrew 100 tankers from service and sent them to the aircraft boneyard at Davis–Monthan AFB, Arizona. Second, the Air Force divided the remaining fleet between the AFRes and AMC. Under this arrangement, the total active inventory fell from 413 aircraft in 1991 to 168 aircraft as of 18 October 1999.[33]

The KC-135 also requires upgrades to meet mandated requirements in the aerospace environment. The avionics replacement program currently under way to achieve this is called PACER CRAG, which performs a number of avionics upgrades to the aircraft. It provides reduced vertical separation minimums that have been required for operations over the North Atlantic since March 1997. It also installs avionics to comply with the Global Air Traffic Management requirements. It installs color radar to detect weather, computerized data loading capability, and embedded Global Positioning Systems, among other avionics. In combination, these upgrades enable the fleet to reduce the number (213) of KC-135 navigators, which will provide savings to the Air Force through a reduced manning cost. However, this implies that installation, maintenance, and repair costs for the new equipment will be less than the manning costs of a navigator per aircraft for future years. AMC's plan is to reduce the number of KC-135 navigators through normal attrition and by reducing the number of navigators trained.[34] Installations began in January 1998, and the fleet will be complete by 2002.

An insufficient crew ratio has occurred in every operation from Desert Shield to Allied Force. During Operations Desert Shield and Desert Storm, USCENTCOM required a KC-135 crew ratio of 2:0, but the manning level set at 1:27—coupled

with the high number of tankers required in theater and for air bridge support—created an impossible situation.[35] Consequently, USCENTCOM had to settle for a 1:5 crew ratio in its KC-135s. Concurrently, SAC's SIOP suffered from a lack of tanker support. This KC-135 crew ratio problem resulted in an increase in the crews' flying hour limit from 125 to 150 hours per month, creating fatigue among KC-135 crews.[36] The increased number of KC-135 sorties required during Operation Allied Force finally resulted in the reexamination of the KC-135's low crew ratio of 1:27 and the renewed call for a 1:56 crew ratio.[37] During the operation, the joint force commander, Gen Wesley Clark, insisted on a KC-135 crew ratio of 1:8; but because of the large numbers of KC-135s involved, additional crews could not be mustered.[38] Even before Operation Allied Force, the Tanker Requirements Study of December 1996 identified shortages in both aircraft and aircrews. Unfortunately, this information was not included in the Defense Planning Guidance for fiscal years 2001 to 2005.[39]

The KC-135 is one of the Air Force's oldest in-service aircraft, with an average fleet age of 39 years; and it has been the backbone of aerial refueling for 45 years.[40] AMC projects the phaseout of the KC-135 fleet beginning in 2013 and continuing through 2040.[41] AMC will analyze the *MRS BURU 2005* for aerial refueling alternatives that will precede KC-135 retirement.[42]

En Route Infrastructure

When AMC stood up in June 1992, the air mobility en route infrastructure included 39 locations with a total of 5,287 manpower authorizations; yet, as of 1 November 1999, there were only 12 locations with only 3,933 manpower authorizations.[43] A smaller worldwide en route basing system must support the strategic flow of airlifters transporting passengers and cargo to two theaters of operation. The challenge lies in determining the best means to airlift passengers and cargo to the combatant commanders in each theater. AMC must choose which facilities it will recapitalize, improve, or remove. This decision is subject to airlift fleet composition, transportation of equip-

ment and passengers, fuel availability, aircraft parking availability, and delivery schedules.

European Structure

In analyzing the Southwest Asian theater of operations, Western Europe is strategically located to support operations in this region. Five of the six en route locations fall between 3,500 and 4,000 NM from both the United States and the Arabian Peninsula: RAF Mildenhall, United Kingdom; Rhein–Main and Ramstein Air Bases in Germany; Rota Naval Air Station in Spain; and Lajes Field in Portugal. The sixth location, Incirlik AB in Turkey, lies near the theater of operations.

The throughput of passengers and cargo depends on five factors at each en route location. The weather factor includes icing conditions and low visibility in Central Europe and Germany, which slowed the delivery of equipment and forces to Bosnia substantially. Weather in Germany can easily close down operations for some period of time in winter months. A second factor is route vulnerability. An example is the denial of French and Spanish overflights during Operation Eldorado Canyon in 1986, which presented a significant dilemma to mission planners. Future denial of foreign airspace by Austria, Switzerland, Eastern bloc nations, or France can introduce substantial delays to an already difficult scenario. A third factor is political support because AMC often contends with constraints such as quiet hours, daylight operation only, holidays, clearance delays, landing rights, and noise abatement in order to comply with foreign regulations. Such anticipated delays add risk to mobility air forces 24-hours-a-day, seven-days-a-week operations. A fourth factor is airfield suitability. Most of air mobility operations overseas occur at bases with single runways. The only multirunway base is Rhein–Main. A closed runway would severely limit air mobility operations. In addition, mobility air forces require bases with high-capacity fuel systems, large ramps, large weight-bearing capacities, and wide clearances from obstacles near runways, taxiways, and ramps. The fifth factor is presence, as it is easier to carry out air mobility operations at locations with an active, day-to-day presence. The uncertainty of access rights, fuel amounts,

obstacles, ramp availability, and other restrictions increases unless there is daily presence to ensure smooth operations.

Pacific Structure

AMC routes most requirements through Alaska, weather conditions permitting, because this route is geographically shorter and only requires one stop to get into theater. Whereas, the mid-Pacific route requires fuel stops at both Hickam AFB, Hawaii, and Andersen AFB, Guam. Fortunately, weather along this route is usually better during the winter months, despite strong seasonal headwinds en route to Guam. Political support comes into play when we reach the Far East due to the need to transit and recover large numbers of airlift and tanker aircraft in Japan. In addition to US military bases, the United States is dependent upon the use of civilian infrastructure to process the passengers and cargo. Unlike the European aerospace infrastructure, which has many alternate civil and military fields to increase flexibility, the Pacific is far more limited.

Constrained Throughput

The current en route infrastructure is unable to support national security objectives for the major theater war model.[44] Weakness in the en route structure constrains mobility air forces current throughput by approximately 20 to 30 percent.[45] The *MRS BURU* used the standard maximum time on ground to calculate airlift capability, which excluded time requirements for required aircraft inspections and proper servicing of aircraft.[46] The use of standard maximum time on ground underestimated the average aircraft's time on ground, resulting in an overestimation of the accuracy of the TPFDD flow by 12 to 13 percent.[47]

At each of the en route airports in Europe, three factors constrain the en route structure: aircraft servicing, fuel, and ramp space. These three factors, which are available in a limited capacity at the en route infrastructure locations, combine to create an "airlift capacity" shortfall of the requirement set by *MRS BURU*.[48] The configuration of these three factors at each of the

en route airports affects each airlifter differently. For example, ramp space in England and Germany can better accommodate C-141s than C-5s. Spain has the ramp space to accommodate the C-5 fleet but cannot meet their fuel requirements. Therefore, the location chosen for the different airlifters to refuel changes the total throughput because the constraining factors vary depending upon both the airport location and the airlifters using it. Consequently, a hierarchy of airlift capacity exists for each fleet depending upon requirements (fig. 4).

	Servicing	Ramp Space and Servicing	Fuel, Ramp Space, and Servicing
C-5 Fleet	Spain	Spain	Germany
C-17 Fleet	Germany	England	Spain
C-141 Fleet	England	Germany	England
KC-10 Fleet	Germany	England	Spain

Source: James P. Stucker, *Analyzing the Effects of Airfield Resources on Airlift Capacity* (Santa Monica, Calif.: RAND, 1999).

Figure 4. Airlift Capacity

Improper use or less effective use of the en route structure can decrease an already constrained system. Conversely, a best route profile would reduce the constraints inherent in the structure and increase throughput.[49] Unfortunately, when employing this best route, throughput stills falls short of the *MRS BURU* requirement. Although it is possible to increase throughput using a best route profile, airlift capacity is still constrained by the en route infrastructure.

The average 30-day throughput requirement, based on the airlift capability of 43.9 MTM/D, falls short. The en route infrastructure is a bottleneck because all 12 overseas locations as well as locations within the United States require some type

of major repairs and upgrades to their aging facilities.[50] For example, fuel storage systems are both in need of repair and require upgrading for greater capacity. To correct en route structure weaknesses, the DLA has earmarked $1.5 billion over the next 20 years for 20 different military construction projects at AMC's overseas locations. AMC earmarked an additional $127 million and established a nine-year plan to improve the living and working conditions of people assigned to these overseas en route locations.[51]

Inability to Achieve Current Requirements

An analysis of MTM/D capacity calculated through objective utilization rates and cargo classifications identifies how the airlift capability shortfall occurs. This study's analysis of the force structure of AMC examined both the airlift fleet and the tanker fleet. This examination revealed C-5 reliability problems, C-141 retirement, and C-17 acquisition as contributing factors to reduced airlift capability. The airlift shortfall occurs in the transportation of both outsize and oversize cargo. In examining KC-135 fleet capabilities, this study identified requirements to increase both the KC-135 aircrew ratio and the number of tankers in order to meet the demands placed on aerial refueling. Next, this study analyzed AMC's en route infrastructure and, in doing so, identified the factors involved with throughput constraints and cited the fixes under way to overcome them over the next 20 years.

Combined shortfalls in airlift capability, tanker capabilities, and en route infrastructure capability present a serious challenge to AMC's achieving its 49.7 MTM/D requirements in accordance with *MRS BURU*. What this study has so far identified is a force structure shortfall in meeting the requirements of a model for two major theater wars. Next, this study will analyze AMC's steady-state operations to determine if a force structure based on two major theater wars can handle those operations.

Notes

1. Col Michael Fricano, "Future Directions of Air Mobility," *Mobility Requirements Study 05*. Slide presentation at the December meeting of the Maxwell chapter of the Airlift/Tanker Association, 13 December 1999, 5.

2. Air Mobility Command (AMC), *1998 Air Mobility Master Plan: Rapid Global Mobility* (Scott Air Force Base [AFB], Ill.: Directorate of Plans and Programs, October 1997), 2–26.

3. Ibid., 2–27.

4. AMC, *Air Mobility Strategic Plan 2000*, Infrastructure (Scott AFB, Ill.: Directorate of Plans and Programs, November 1999), 2.4.1.

5. Ibid., 2.3.1.1.

6. Fricano, 6.

7. James P. Stucker, *Analyzing the Effects of Airfield Resources on Airlift Capacity* (Santa Monica, Calif.: RAND, 1999), 55.

8. USTRANCOM Handbook 24-2, *Understanding the Defense Transportation System*, 1 October 1998, 5.

9. AMC, *Air Mobility Command, Command Data Book* (Scott AFB, Ill.: Quality and Innovation Flight, November 1999), 12.

10. Department of the Air Force, *United States Air Force Statistical Digest, Fiscal Year 1996* (Washington, D.C.: Assistant Secretary of the Air Force for Financial Management and Comptroller, 1997), 95–98.

11. Fricano, 57.

12. Department of the Air Force, *United States Air Force Statistical Digest*, 95–97.

13. AMC, *Air Mobility Command, Command Data Book*, 5.

14. AMC, *Air Mobility Strategic Plan 2000*, 2–29.

15. AMC, *Air Mobility Command, Command Data Book*, 5.

16. Fricano, 57.

17. Ibid., 62.

18. Ibid., 66.

19. Department of Defense, Logistics Directorate, *Mobility Requirements Study Bottom-Up Review Update* (Washington, D.C.: Joint Chiefs of Staff, 28 March 1995), C-1.

20. Fricano, 6.

21. US Congress, *Military Airlift: Options Exist for Meeting Requirements While Acquiring Fewer C-17s*, General Accounting Office (GAO)/NSIAD-97-38 (Washington, D.C.: GAO, February 1997), 4.

22. AMC, *Air Mobility Strategic Plan 2000*, 2.4.1.1.

23. James K. Matthews, *General Kross, Commander in Chief United States Transportation Command and Commander Air Mobility Command: An Oral History* (Scott AFB, Ill.: United States Transportation Command, October 1999), 62.

24. AMC, *Air Mobility Command, Command Data Book*, 6; and Ficano, 21.

25. Matthews, 63.

26. Ibid., 64.

27. Fricano, 39.

28. Ibid., 84.

29. Tamar A. Mehuron, "USAF Almanac 1998: The Air Force in Facts and Figures," *Air Force Magazine*, May 1998, 53.

30. AMC, *Air Mobility Command, Command Data Book*, 7.

31. Fricano, 6.
32. Juliane K. Smith, Lt Col Steve Cheavens, and Maj Michael Zenk, *1991 Tanker Study* (Offutt AFB, Nebr.: Strategic Air Command, 1 March 1991), 4–8.
33. Department of the Air Force, *United States Air Force Statistical Digest*, 95; and AMC, *Air Mobility Command, Command Data Book*, 12.
34. Fricano, 66. This is AMC's official position on navigator reduction due to PACER CRAG.
35. Dr. Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 3, *Logistics and Support* (Washington, D.C.: Government Printing Office, 1993), 204.
36. Ibid.
37. Gen Charles T. Robertson, keynote speech to the Airlift/Tanker Association, Dallas, Texas, 6 November 1999.
38. John A. Tirpak, "Airlift Reality Check," *Air Force Magazine*, December 1999, 36.
39. AMC, *Air Mobility Strategic Plan 2000*, 2.4.2.
40. Mehuron, 53. The KC-135 fleet and the B-52 fleet together are the two oldest fleets in the Air Force; both have an average fleet age of 39. As of 30 September 1997, Mehuron cites that both fleets are each 36. Consequently, in the fall of 2000, both fleets were 39.
41. Fricano, 81.
42. Ibid., 81.
43. Ibid., 40–41.
44. Matthews, 57.
45. Fricano, 46.
46. James P. Stucker et al., *Understanding Airfield Capacity for Airlift Operations*, Report no. MR-700-AF/OSD (Santa Monica, Calif.: RAND, 1998).
47. James P. Stucker, *Analyzing the Effects of Airfield Resources on Airlift Capacity* (Santa Monica, Calif.: RAND, 1999), vi, 10. Stucker calculated ground times of each of AMC's airlifters by estimating the duration of all the functions that an airlifter processes through during each sortie. He included required inspections and servicing, which the *MRS BURU* failed to incorporate into its calculations.
48. Ibid., 73–76.
49. Ibid., 63–70.
50. Matthews, 57.
51. AMC, *1998 Air Mobility Master Plan*, Objective 2b2: Upgrade En Route Facilities to Meet Command Standards.

Chapter 5

Need For a New Force Structure

The burden placed on U.S. strategic mobility forces will not become less demanding in the future. To the contrary, the potential demands of peacetime engagement, reduced infrastructure at overseas bases needed to support airlift enroute to a crisis, the likelihood of smaller-scale contingencies worldwide, and the increased possibility of confronting nuclear, biological, and chemical threats all pose challenges for mobility forces that were not accounted for in the mobility update.

—*Quadrennial Defense Review*
November 1997

Current US defense strategy calls for military forces to fight two major theater wars at the same time.[1] The magnitude of equipment and materials needed to fight two major theater wars prompted USTRANSCOM to assess its requirements for airlift, sea lift, and prepositioning—which resulted in the *MRS BURU.* AMC established its force structure requirements based on its portion to airlift military forces in support of the two major theater wars construct.

The force structure of AMC currently performs many steady-state operations that include air mobility operations for small-scale contingencies, noncombatant evacuations, peacekeeping, peace enforcement, humanitarian assistance, domestic and international emergency relief, and special airlift operations.[2] The number of steady-state operations has risen significantly since the end of the Cold War. The secretary of defense in his *QDR* says to expect an increase in mobility, yet numbers of both air mobility personnel and airframes continue to decline without authorizations to replace them.

This study examines the current use of mobility air forces by citing the needs set by the *QDR* and then examining the growth of steady-state operations performed by AMC. Next, this study examines the various types of small-scale contingency operations, humanitarian and peace operations, and special airlift operations.

Quadrennial Defense Review

In 1997 the military force structure designed to meet the requirements to fight two major theater wars received criticism when the administration of President Clinton reassessed the nation's military force structure in its Bottom-Up Review. Congress posed three main questions concerning the planned force structure for two regional wars.[3] What are the underlying assumptions of the planning strategy? Are military force levels that are recommended to carry out that strategy sufficient? What is the funding proposed for such recommended force levels?

To answer these questions, Congress passed the *National Defense Authorization Act for Fiscal Year 1997* in which Congress tried to grasp the force structure requirements when they stipulated the following:

> In order to ensure that the force structure of the armed forces is adequate to meet the challenges to the national security interests of the United States in the twenty-first century, to assist the secretary of defense in conducting the review referred to in paragraph (5), and to assess the appropriate force structure of the armed forces through the year 2010 and beyond (if practicable), it is important to provide for the conduct of an independent, nonpartisan review of the force structure that is more comprehensive than prior assessments of the force structure, extends beyond the *Quadrennial Defense Review,* and explores innovative and forward-thinking ways of meeting such challenges.[4]

This law also authorized the secretary of defense to conduct the first *QDR,* which would include an examination of the military force structure. In compliance with this directive, the secretary of defense produced the *QDR,* which examined mobility requirements from a viewpoint of several scenarios to include small-scale contingency operations, two major theater wars, and regional conflicts against hostile governments.

To meet mobility objectives, the *QDR* cited the 1995 *MRS BURU,* which recommended an airlift capability to transport 49.7 MTM/D.[5] This figure has been the benchmark ever since AMC released the *MRS BURU.* The secretary of defense in his *QDR,* however, also acknowledged the growing need for mobility assets. He stated,

> The burdens placed on US strategic mobility forces will not become less demanding in the future. To the contrary, the potential demands

> of peacetime engagement, reduced infrastructure at overseas bases needed to support airlift en route to a crisis, the likelihood of smaller-scale contingencies worldwide, and the increased possibility of confronting nuclear, biological, and chemical threats all pose challenges for mobility forces that were not accounted for in the mobility update. These and other key issues will be evaluated and will receive increased emphasis as DOD formulates upcoming budget requests for strategic mobility programs.[6]

While mobility requirements rose, air mobility capacity declined during the next five years. By 1997 AMC could no longer achieve the 49.7 MTM/D recommended for two major theater wars.

Steady-State Operations

Since the end of the Cold War and the stand up of AMC, the world political situation has prompted a growth in the need for mobility air forces. In fiscal year 1994, AMC transported 237,000 tons of cargo and 850,000 passengers and participated in 80 JCS exercises as well.[7] Thus, the monthly average of passengers and cargo transported in 1994 approaches the monthly average of those transported during the Gulf War and has not significantly decreased since.

This increase in air mobility operations is due to the United States intervention in international political situations before they boil into a crisis. The United States has increased its involvement in UN missions because the United States is the only country with an air mobility system capable of transporting military troops and equipment around the globe.[8] The United States policy aims to achieve three things. First, the United States seeks to enhance its security by securing its interests worldwide. Second, the United States seeks to bolster its economic prosperity by keeping open the markets of nations who trade with the United States. Third, the United States seeks to promote democracy abroad, which includes assisting fledgling democracies.

Smaller-Scale Contingency Operations

The number of smaller-scale contingencies rose from 11 percent of AMC's operations during the 1980s to 32 percent in

the 1990s. These may pose different challenges for strategic lift and more airlifters. For example, USTRANSCOM transports supplies to places that are landlocked—such as Afghanistan, Angola, Belarus, Tajikistan, and Mongolia. In another example, USTRANSCOM transports military forces directly to their final destination—such as Sarajevo—rather than to a point en route to their final destination. Furthermore, many regions of the world lack modern airport facilities, long enough runways, or proper unloading equipment. Planning for such situations increases USTRANSCOM's requirement for C-130s and C-17s due to their maneuverability and ability to land at austere locations. Thus, three questions arise. Do mobility air forces have enough airlifters to transport cargo for smaller operations? Will mobility air forces meet the timelines set by the TPFDD? Will the NCA accept a slower TPFDD, which also means a riskier deployment schedule?

A 1995 analysis by the General Accounting Office concluded that 40 C-17s could deliver cargo to any one of three small-scale contingency operations under a small risk, which included a peacekeeping mission, a humanitarian operation, and a noncombatants evacuation. Unfortunately, this analysis did not evaluate how many C-17s USTRANSCOM would require to conduct these operations simultaneously.[9]

During Operation Joint Endeavor in Bosnia from 4 December 1995 to January 1996, 1,535 airlift sorties transported 10,933 passengers and 20,791 tons of cargo. Before Operation Allied Force in Kosovo began, AMC initiated Operation Phoenix Duke I, in which 150 tankers deployed to locations in Europe to establish an airbridge. Along with them, AMC sent tanker airlift control elements (TALCE) to provide the required air mobility support for both the airbridge and the new channel structure. First put in place on 11 October 1998, AMC redeployed them in early November because the Yugoslav government agreed to NATO's terms. When the Yugoslav government again sought to dispute NATO demands, President Clinton announced the execution of Operation Allied Force. Immediately, AMC initiated Operation Phoenix Duke II by again deploying 150 tankers and TALCE teams on 18 February 1999.

Global Attack Operations

To reduce limitations of time and range, combat aircraft depend on aerial refueling. Bombers in the CONUS prepared to hit targets in a specific theater of operations and launch on nonstop bombing missions from the CONUS. The feasibility of these missions requires air mobility support in the form of both tankers and TALCEs. The TALCEs deploy to the deployed locations of the tankers, which perform the aerial refueling required by the bombers. In addition, these same TALCEs provide the bombers with an en route infrastructure of emergency airfields.

Mobility air forces deploy fighters to locations in-theater. Tankers move the fighters from CONUS to the theater of operations, where the fighters arrive ready to perform their missions. While working in the theater, fighters also rely on tankers to sustain them with fuel while airborne so that they can continually engage any airborne adversary without flying back to their base of operations to refuel and rearm their aircraft.

Sustaining combat air forces with materials and equipment once they are deployed in-theater requires ALOCs. Strategic airlifters require aerial refueling because they transit from the CONUS to operations in different theaters around the globe. Strategic airlifters using channels transport cargo to aerial ports where air mobility support units transfer the cargo from the strategic airlifters to tactical airlifters. The tactical airlifters, in turn, transport the cargo to combat forces at their concentration points. Requirements for aerial refueling will increase with the Air Force's objective for achieving agile logistic support and the focused logistics concept identified in *Joint Vision 2010*. Agile means flexible, which requires airpower. ALOCs are the means by which the United States supports its operations in theaters around the world because ALOCs provide the avenue for rapid global response.

Deterrence Operations

The United States often seeks to deter other states from taking action against US interests. The threat of increasing a government's civilian costs will deter that government from exerting its political will through military aggression.[10] With

increasing civilian costs in mind, if the United States wants to prevent a country from exerting its political will through military means, the United States could build up military forces in a neighboring country. The potentially aggressive country would interpret the buildup as a threat to its people if it acted militarily to exert its political will. Thus, this perceived threat raises the cost to that country if it decides to exert its political will through military force.

This argument requires a tremendous amount of airlift to deploy the coercive airpower assets into theater rapidly. Airlift is the prime mode of transportation because coercive airpower assets can only move into theater by employing air mobility assets. Fighter aircraft deploy by employing tankers for coronet support, and their maintenance support must deploy by air because those fighters will require maintenance for reconstitution after the initial deployment flight. Reconstitution is also required if the fighter aircraft are going to fly combat patrol sorties once they arrive in-theater as espoused in Air Force doctrine.[11]

Prepositioning of these assets is moot because advanced notice is required to build a TPFDD, which would determine both the deployment schedule and the preposition structure. Furthermore, the United States does not possess enough assets to do both. The United States cannot preposition coercive airpower assets at every possible crisis spot in the world. However, the United States also employs coercive airpower assets in the numerous operations under way at any given time around the world. Unfortunately, US forces cannot employ prepositioned assets for operations currently in progress.

Supporting the deterrence argument are NFZ operations. Upon the termination of the humanitarian operation—Provide Comfort, which preceded Operation Northern Watch—the Turkish government approved continuing the air operation from Incirlik AB, Turkey, as the new military operation, Northern Watch, which began on 1 January 1997.[12] A JTF charged with conducting air operations over northern Iraq, Operation Northern Watch enforces the NFZ established by United Nations Security Council Resolutions 678, 687, and 688, which has no termination date and which continues today. A com-

bined JTF, Operation Northern Watch employs forces from the United States, the United Kingdom, and Turkey, where the combined forces total approximately 45 aircraft and 1,100 personnel. The joint forces from the United States include Air Force, Army, Navy, and Marines. The joint forces from the United Kingdom include Royal Air Force and Royal Army. The joint Turkish force includes army, navy, and air force.

Operation Southern Watch also sought to deter Iraqi aggression. The atrocities committed by Iraqi military forces against Shiite Muslims in southern Iraq prompted an action similar to Operation Northern Watch. Beginning on 18 August 1992, Operation Southern Watch also continues today with an unspecified termination date. In support of this operation, AMC deploys, sustains, and redeploys US military forces to and from Saudi Arabia to enforce the ban on Iraqi flights below the 32d parallel.[13] This NFZ operation also requires deployed tankers to refuel the allied combat air patrols performing the military occupation of Iraqi airspace.

Noncombatant Evacuation Operations

Operation Assured Response, the evacuation of noncombatant Americans from Liberia in April of 1996, provides an example of the removal of hundreds of noncombatants from the threat of war by air mobility. During Assured Response, 94 sorties evacuated 2,153 passengers and 2,148 tons of cargo.[14]

Airdrop Operations

To seize some airfields, the Army would deploy brigade-size forces anywhere in the world within a short time frame. To accomplish that, USTRANSCOM would air-drop a ground force of 2,500 troops with their equipment from the United States or from a staging area in either Europe or the Pacific Rim. After the initial airdrop, airlifters would deliver additional equipment to reinforce those units. USTRANSCOM conducted large airdrops into Grenada in 1983 and Panama in 1989, and it was prepared to conduct one into Haiti in 1994.

Once the C-141 fleet retires, USTRANSCOM will need at least 100 C-17s to conduct a large airdrop at a moderate level

of risk. With a smaller number of C-17s, the United States could not insert its forces as rapidly, creating a higher risk. A fleet with 120 C-17s could transport the brigade-size force within the necessary timelines with low to moderate risk.

Direct Delivery Operations

The Army would like USTRANSCOM to transport cargo directly from the United States to sites near the battlefield. The C-17 can perform this mission but, as discussed in chapter 3, will be restricted depending on the terrain. However, if some C-17s conduct airdrop missions, how many will be available to perform airlift in accordance with the TPFDD. In other words, the pace of deployments from the United States would slow down significantly.

Intratheater Transport Missions

Rather than devoting all C-17s to strategic airlift, regional CINCs may want to devote one or two squadrons for intratheater airlift. If USTRANSCOM assigns some C-17s for intratheater airlift, they would experience a shortfall in strategic airlift. Again, as with direct deliveries, the pace of deployments from the United States would slow down significantly. USTRANSCOM would consequently need to buy more airlifters to make up for the shortfall in strategic airlift for outsized and oversized cargo. The CRAF could add strategic airlift capability for transporting passengers and bulk cargo. Conversely, with fewer strategic airlifters USTRANSCOM would rely on trains and trucks to transport outsize cargo intratheater, which would be far slower than by air.

Humanitarian and Peace Operations

Humanitarian operations and peace operations are on the rise. The United States spent more than two billion dollars in 1990 on humanitarian and peace operations, whereas in 1995 those operations cost more than nine billion dollars.[15] Mobility air forces participated in 167 humanitarian operations assisting 74 countries from 1990 to 1996, which comprised 12 percent of US military operations.[16] A quick examination of

several humanitarian operations shows the varied capabilities of mobility air forces required to perform them. These operations often task air mobility assets to the limits of their current force structure, as an examination of several operations will demonstrate.

Long-term humanitarian operations require air mobility to establish TALCEs on the newly created channels, whereas smaller operations rely on the TALCEs on existing channels. The TACC deployed TALCEs to support numerous air mobility unusual operations. A few examples demonstrate the need for air mobility support. During Operation Provide Transition—from 12 August 1992 to 7 October 1992—with Angolan elections pending, US airlifters transported demobilized Angolan soldiers to their homes following negotiations to end the 16-year-old civil war. AMC, through 326 sorties, transported 8,805 passengers and 295 tons of cargo. During Operation Provide Relief—from 21 August 1992 to 28 February 1993—AMC deployed to Mombasa, Kenya, to transport food to the drought-ridden population of Somalia, where more than 3,100 sorties delivered 34,400 tons of cargo. During Operation Impressive Lift—from 13 September to 29 September 1992—AMC transported UN peacekeeping forces from Pakistan to Somalia. Ninety-four sorties delivered 74 passengers and 1,168 tons of cargo.

Humanitarian operations began following the Gulf War when several popular uprisings erupted in Iraq. Many nations hoped that any one of these might be successful. Unfortunately, Saddam Hussein promptly moved his remaining military forces to crush the uprisings, which occurred in the Shiite south and the Kurdish north. During the war, President George Bush called upon the people of Iraq to remove Saddam from power but probably did not expect to provide military support to prevent Saddam from killing masses of his own people.[17] Unfortunately, both the Kurds and the Shiites succumbed to the genocidal wrath of Saddam, and the United States felt obliged to prevent these killings; thus, a month after Desert Storm ended Operation Provide Comfort began. From April 1991 until 31 December 1996, Operation Provide

Comfort required 33,381 sorties to transport 29,555 passengers and 118,340 tons of cargo.

Humanitarian operations began following the involvement of nongovernmental agencies in Somalia where civil war and disease killed many Somalis. To alleviate Somali suffering, numerous relief organizations began to provide food and clean water. However, the tumultuous effort included international agencies that worked in an uncoordinated fashion and with insufficient equipment to deliver food across Somalia. The United States, without much notice, decided to help by initiating Operation Restore Hope. Therefore, from 9 December 1992 to 10 May 1993, AMC flew 1,182 sorties in Operation Restore Hope to transport 51,431 passengers from 22 allied nations and 41,243 short tons of cargo. The UN sanctioned this military intervention into Somalia in order to safeguard the delivery of food to the starving Somali population. Furthermore, tankers flew 1,170 sorties that transferred 82 million pounds of fuel. On 13 January 1993, a commercial air carrier redeployed 244 marines.

During Operation Restore Hope, as in many humanitarian operations, TALCEs were critical because Somalia had virtually no trained airport personnel capable of handling the huge amount of air traffic. The airfields inside Somalia had deteriorated from the years of disrepair and war. The first TALCE in Somalia was set up at the Mogadishu airport and controlled all intratheater airlift operations. It performed surveys to examine the extent of damage and coordinated with Navy Seabees to scrape the thick foliage from the airfield's runways, taxiways, and aircraft parking aprons.[18] In addition, TALCE personnel billeted themselves in an abandoned hangar until portable shelters arrived. As operations increased, the Mogadishu TALCE detached personnel to establish another TALCE at Kismayu and then at Bardera and again until the total number of TALCEs in Somalia reached seven.[19]

Peacekeeping. In 1994 US forces changed their plans from an invasion of Haiti to a peace operation. The United States decided to install the elected president by force if the ruling junta failed to step aside peacefully. The deadline passed and, with time running out, US forces massed to invade Haiti. How-

ever, the US envoys Colin L. Powell and former President James Earl "Jimmy" Carter Jr., negotiated the general's compliance. Mobility and combat aircraft were airborne and on their way to commence Operation Restore Democracy, although the US envoys had not yet left Haiti. The execution hour came and went while the military aircraft remained airborne awaiting orders. The envoys emerged with the junta leaders in agreement to restore President Jean-Bertrand Aristide to Haiti. The operation was instantly renamed Uphold Democracy, and military forces entered Haiti unopposed. Aircraft in Haiti—from September 1994 to April 1995—conducted 2,651 airlift sorties, transporting 24,152 passengers and 22,274 tons of cargo.

Peace Enforcement. When ordered by the NCA, USTRANSCOM deploys military forces to enforce a peace between factions, such as in the operations in Kosovo. Peace enforcement operations adhere to more rigid schedules than a peacekeeping deployment and usually involve a much greater number of military forces with their heavy equipment. Thus, peace enforcement operations place greater demands on mobility air forces than do peacekeeping operations.

Emergency Relief. The NCA relies on AMC to airlift supplies and passengers for relief of natural disaster victims worldwide both inside and outside of the CONUS. Domestically, AMC led relief efforts during the July 1998 everglade fires in Florida, providing 740 tons of firefighting equipment from the northwestern United States. The oversized firefighting equipment required the use of C-5s and C-141s. Internationally, AMC is the lead organization to respond to emergencies. For example, following the American Embassy bombings in August 1998, mobility air forces flew more than 100 sorties to evacuate embassy employees, wounded, and deceased. Mobility air forces also provided transportation to the State Department, the Federal Emergency Management Agency, and other governmental agencies.[20] These emergencies overlap the timelines and requirements of other operations while daily routine sorties must continue, thus taxing the air mobility system to its limit.

Helping Former Adversaries. The creation of the Commonwealth of Independent States gave the United States a perfect op-

portunity to assist these new governments with the hope that they would become democratic nations. During Operation Provide Hope—from 14 June 1992 to May 1993—AMC operated 109 sorties, including 25 by commercial aircraft, to transport 2,438 tons of cargo. By 17 June 1997 AMC had flown more than 500 missions to the states of the former Soviet Union.

Requirements Imposed on Mobility Air Forces

The above operations exemplify the varied requirements placed on air mobility forces. The number of missions and sorties per year required to transport passengers and cargo has exceeded the capabilities of AMC's fleet of military aircraft.[21]

What is common about all these different operations is that they all required unplanned air mobility support. Most required execution before the theater commander and USTRANSCOM could build a TPFDD. With such last minute requirements for movement, the default means of transportation is by airlift. For some other operations, the theater commanders validated TPFDDs to move military forces in place for their operation. However, once the NCA executed the theater commander's plan, either the military circumstances changed or the political objective changed. Thus, the TPFDD requirements changed because the theater command needed military forces in-theater sooner than the TPFDD scheduled them. Airlift provides the quickest means to move forces into theater. Small-scale contingency operations and humanitarian operations have become AMC's steady-state operations.

The NCA seek action at the most appropriate time, often immediately when a situation arises which requires rapid global mobility. The rapid global response capability of airpower puts AMC at the threshold of every operation. Unfortunately, world situations can occur simultaneously and so does air mobility's response, which causes operations to occur cumulatively. In other words, one operation overlaps another operation. Thus, the cumulative effect of these steady-state operations tasks mobility air forces beyond their daily limit.

Strategic Airlift

In 1997 Gen Walter Kross, then CINCTRANSCOM, addressed the requirements for an airlift force structure. He said, "We need about 260 T-tails to do our global work every day for training, maintenance, depot, testing, and our daily worldwide missions."[22] In referring to T-tails, General Kross means strategic airlifters in AMC's authorized aircraft inventory, which includes the C-141, the C-17, and the C-5. As of 18 October 1999, AMC possessed only 180 T-tails to perform AMC's steady-state operations.[23] Consequently, AMC is 60 T-tails short of its requirements to perform strategic airlift effectively in support of its steady-state operations.

Aerial Refueling

In 2000 the KC-135 crew force was scheduled to deploy to support steady-state operations. These operations included task forces at Gielenkirchen AB, Germany, and Naval Air Station, Keflavik, Iceland, business efforts, mission employments, flags exercises, JCS exercises, and coronets—as well as operations Joint Forge, Northern Watch, and Southern Watch, which require 18,880 TDY days from the KC-135 crew force.[24] However, this misleads analysts because it excludes time in transit and the overlap time required to swap out crews.[25] Dividing the total TDY days required by an active duty crew for 231 crews averages out to 81.73; and when Guard and Reserve crews are calculated in, the average drops to 51.45 days per crew.[26] This figure also misleads analysts for four reasons.[27] First, the 51.45-day TDY rate includes authorized staff personnel at the squadron, wing, and headquarters levels who cannot deploy because of their required staff duties. Second, the 51.45-day TDY rate assumes that the Guard and Reserve assume an equal share of the deployments based on the total number of Guard and Reserve crews. Unfortunately, Guard and Reserve crews are only part-time and can only assume a fraction of the tanker deployments. Furthermore, these steady-state operations exclude unplanned contingencies that could involve the entire 231 crew active duty tanker force. For example, Operation Allied Force involved 238 KC-135 crews

during the 78 days of global attack.[28] Fortunately, the president activated the KC-135 Guard and Reserve units to augment the active duty. However, during Operation Allied Force, the tanker force left many steady-state requirements unfulfilled due to insufficient assets.

Expeditionary En Route Structures

When mobility air forces operate at deployed locations with a limited infrastructure, they require an expeditionary en route support system. AMC's global reach laydown (GRL) concept provides the flexibility to establish these en route stations around the globe. Under GRL, resources from various CONUS-based organizations are brought together to form the required expeditionary units to achieve the objectives of any air mobility operations.[29] The GRL concept allows AMC to siphon off assets from permanent mobility air force units to create deployable en route force structure units. The TACC maintains operational control of this deployable force structure.

GRL provides deployable forces to augment fixed en route locations and establish en route locations where none existed before. These air mobility support units, stationed both in the CONUS and at overseas locations, expand and contract according to the requirements for support.

Different sizes and configurations meet the flexible demands of expeditionary en route support. First, a TALCE is a mobile unit organized to provide on-site management of mobility airfield operations. Commanded by a commissioned officer, a TALCE is a temporary unit composed of various mission support elements that deploys to provide mission support when theater C^2, mission reporting, or required mission support functions are insufficient.[30] TALCEs also provide aerial port, logistics, maintenance, security, weather, medical, and intelligence services for aircraft when needed.

The second type of unit is a mission support team (MST), which is smaller than a TALCE but provides similar support on a smaller scale.[31] Commanded by a noncommissioned officer, MSTs provide lower level of C^2, aerial port, and maintenance services for one aircraft. The third unit is a mission support element (MSE), which is a unit of specific personnel

and equipment that supports specific airfield operations. For example, an intelligence shop or weather shop could be an MSE. These units may be an element of a TALCE, an MST, or a stand alone unit.

The TACC tailors the size and configuration of each GRL unit by selecting the appropriate personnel and equipment to form deployable TALCEs, MSTs, or MSEs for each required location.[32] Each GRL unit will fit the specific contingency concept of operations and will begin functioning at its deployed location in three to five days with follow-on sustainment after 30 days.[33]

One air mobility support squadron under each air mobility support group contains an air mobility control flight capable of providing an immediate initial response TALCE, MST, or MSE. These units provide the core functions of air mobility support: C^2, aerial port operations, and aircraft maintenance. They also provide additional support capabilities, such as weather or intelligence operations, as necessary. Air mobility operations groups, airlift control squadrons, and airlift control flights from the Guard and Reserve provide the assets to deploy for these operations. Thus, the permanent air mobility force structure provides the personnel, equipment, training, and procedures for deployed operations. It is from these units—collectively referred to as air mobility control units—that C^2, aircraft maintenance, and aerial port personnel deploy to conduct air mobility support operations. Additional personnel and equipment required to deploy for any additional support capabilities beyond these core functions come from out of hide. That is air mobility wings, AMC headquarters, and anywhere from which the Air Force personnel center can steal an asset.[34] Thus, when the personnel center takes a body from an organization, that organization must meet its own requirements with fewer personnel. The deployed structure of air mobility support units is consequently ad hoc.

The TACC provides GRL units to several simultaneous contingency operations worldwide. AMC must ensure that it has enough assets to deploy and meet these GRL requirements. Consequently, the force structure should include requirements to perform the contingency duties.

Dedicated Training Sorties

As noted, maintaining ALOCs in hostile environments requires special tactics and procedures. In order for these tactics and procedures to work, aircrews must train and practice. Unfortunately, crews cannot practice many of these tactics and procedures during routine airlift sorties for several reasons. First, classified equipment may be required. If a crew is going to remain overnight at an overseas location, as is nearly always the case, the crew cannot secure the classified equipment. Second, many of these combat procedures do not correspond to normal flight rules and regulation and, therefore, are restricted to special use areas. Third, other procedures require a dedicated airfield because in order for the airlifter to practice its special training, the airlifter requires the airfield to perform certain special nonstandard procedures incongruent with normal airfield operations. These three broad areas explain the need for dedicated training sorties. Unfortunately, air mobility assets would have to reduce the number of operational sorties they perform in order to conduct the type of specialized training sorties they need to perform efficiently during operations in hostile environments.

Air mobility assets require special sorties dedicated solely for training in order to become proficient at maintaining ALOCs when operating in a hostile environment. A lack of proficiency in combat tactics and procedures can result in an aircrew losing their lives along with the aircraft they fly. Unfortunately, mobility air forces are unable to proficiently achieve these training requirements due to the high operations tempo set by the above-mentioned steady-state operations.

Notes

1. Air Mobility Command (AMC), *1998 Air Mobility Master Plan: Rapid Global Mobility* (Scott AFB, Ill.: Directorate of Plans and Programs, October 1997).

2. National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Washington, D.C.: Government Printing Office, December 1997), 25.

3. *National Defense Authorization Act for Fiscal Year 1997*, Public Law 104-201, 104th Cong., 2d sess., H.R. 3230, subtitle B—Force Structure Review, sec. 922.

4. Ibid., para. 7.

5. Department of Defense (DOD), *Mobility Requirements Study Bottom-Up Review Update (MRS BURU)* (Washington, D.C.: Joint Chiefs of Staff, 28 March 1995), 8.

6. Ibid., 8.

7. History, Air Mobility Command, *AMC 1995 Historical Highlights*, Scott AFB, Ill.: AMC History Office, 1996, 1–5.

8. Keith A. Hutcheson and Charles T. Robertson, *Air Mobility: The Evolution of Global Reach* (Vienna, Va.: Point One, September 1999), 32.

9. US Congress, *Moving US Forces: Options for Strategic Mobility* (Washington, D.C.: Congressional Budget Office, February 1997), 54.

10. Thomas C. Schelling, *Arms and Influence* (New Haven, Conn.: Yale University Press), 1966, 91. Schelling refers to this as the creation of risk, which is brinkmanship.

11. Air Force Doctrine Document (AFDD) 2-6.2, *Air Refueling*, 19 July 1999, 18.

12. SSgt John DeShetler, Command Task Force (CTF) historian, *History of Operation Northern Watch* (Incirlik AB, Turkey: CTF, September 1999), 1.

13. History, *Air Mobility Command 1992 Historical Highlights* (Scott AFB, Ill.: AMC History Office, 1993), 1–5.

14. AMC, *Air Mobility Strategic Plan 2000* (Scott AFB, Ill.: Directorate of Plans and Programs, November 1999), 2–25.

15. Hutcheson and Robertson, 83.

16. Ibid.

17. Michael Sullivan, *The Gulf War* (Frontline: WGBH Educational Foundation, 1996), two videocassettes.

18. John L. Cirafici, *Airhead Operations—Where AMC Delivers: The Linchpin of Rapid Force Projection* (Maxwell AFB, Ala.: Air University Press, March 1995), 41.

19. Ibid., 54.

20. Hutcheson and Robertson, 93–97.

21. Alan Vick et al., *Preparing the U.S. Air Force for Military Operations other Than War* (Santa Monica, Calif.: RAND, 1997), 141–60.

22. Gen Walter Kross, keynote speech to the 1997 Airlift/Tanker Association convention, Anaheim, Calif., 25 October 1997.

23. AMC, *Air Mobility Command, Command Data Book* (Scott AFB, Ill.: Quality and Management Innovation Flight, November 1999), 12.

24. Ibid., 9. Business efforts are TDY assignments where tankers and their crews deploy at numerous overseas locations worldwide to conduct aerial refueling training operations for US and allies' aircraft.

25. David E. Thaler and Daniel M. Norton, *Air Force Operations Overseas in Peacetime: OPTEMPO and Force Structure Implications*, Project Air Force documented briefing (Santa Monica, Calif.: RAND, 1998), vi. Tanker temporary duty rates for crews are well below the Air Force goal of 120 days.

26. AMC, *Air Mobility Command, Command Data Book*, 9.

27. Thaler and Norton.

28. Lt Gen William J. Begert, "Kosovo and Theater Air Mobility," *Aerospace Power Journal*, Winter 1999, 11–12.

29. AMC, *1998 Air Mobility Master Plan*, 4–28.

30. AFDD 2-6, *Air Mobility Operations*, 25 June 1999, 60.

31. Ibid.

32. Col John Brower, AMC chair to Air University, Maxwell AFB, Ala., interviewed by author, 22 January 2000.
33. AMC, *1998 Air Mobility Master Plan*, 4–22.
34. AFDD 2-6, 62.

Chapter 6

Technological Innovation Requirements

> *At this moment in history, the United States is called upon to lead—to organize the forces of freedom and progress; to channel the unruly energies of the global economy into positive avenues; and to advance our prosperity, reinforce our democratic ideals and values, and enhance our security.*
>
> —President William J. Clinton

A relationship exists between technological innovation and the NSS that affects the nation's military air mobility strategy. Influences on air mobility strategy include the international security environment where threats to US interests affect the NSS. This, in turn, directs the defense transportation strategy and, subsequently, air mobility strategy. DOD, in building a better defense transportation strategy and operational vision, needs to provide the resources for technological innovations applicable to air mobility forces in order to achieve the vision set forth in the NSS.

An examination of the NSS identifies the requirements for air mobility. An examination of the US policy of intervention to achieve the NSS reveals the requirements uniquely suited to air mobility. The US intervention policy affects the AMC issues of operations tempo, personnel tempo, doctrine, and air mobility organizations. Existing technological innovations could improve these issues, and the initiation of new technological innovation could further improve air mobility operations.

Air Mobility: Key to National Security

World politics reflect the international strategic environment, which in turn influences our nation's security strategy. DOD uses several guideline documents or tools to prepare and execute our nation's security strategy. Those tools include *A National Security Strategy for a New Century*, published by the White House; the *Quadrennial Defense Review*, published by

the secretary of defense; the corresponding NDP publication, *Transforming Defense: National Security in the 21st Century;* and *Joint Vision 2010.*

The NSS addresses the need for air mobility in its first core objective: enhancing US security. The strategy for enhancing our security abroad is threefold: shape the international environment, respond to crises, and prepare for an uncertain future.[1] The *QDR* reiterates this "shape, respond, and prepare" trio-strategy as does the national military strategy. Air mobility is an essential element in all three strategies.

In shaping the international environment, the United States must possess a credible military force where military activities include overseas presence and peacetime engagement and the will to use military force.[2] According to the NDP, overseas presence is the key to a stable international environment.[3] Peacetime engagement includes rotational deployments that help sustain regional stability by deterring aggression and exercises with foreign nations that solidify relations with those nations.[4] Deployments and exercises both require air mobility in the form of both airlift and air refueling in order to transport the necessary troops and equipment. Peacetime engagement also includes other programs such as the Nunn–Lugar Cooperative Threat Reduction Program where the United States assists members of the Commonwealth of Independent States in dismantling and storing WMD.[5] Here, air mobility is the lead component by transporting nuclear weapons to the United States from compliant nations.

Airlift also plays a crucial role in responding to threats and crises by enhancing our war-fighting capability.[6] The United States may move some forces nearer to a theater in crisis and rapidly deploy other forces into that theater. Depending on the crisis, forces from the Army, Navy, Air Force, Marines, or any combination of military personnel and equipment could comprise the force structure required. Consequently, the United States must airlift these forces along with the needed logistics support. In addition, the focused logistics concept of *Joint Vision 2010* requires the transportation of supplies and materials to support these forces within hours or days rather than weeks, a mission solely suited to air mobility.

In responding to crises, forces may deploy in support of smaller-scale contingencies which include humanitarian assistance, peace operations, enforcing NFZs, evacuating US citizens, reinforcing key allies, limited strikes, and interventions.[7] Today, US forces find themselves globally engaged in responding to these contingencies more frequently and maintain longer-term commitments to support these contingencies. In these situations, many deployments occur in the absence of forward basing.[8] The loss of forward basing has reduced AMC's worldwide infrastructure from 39 locations in 1992 to 12 in 1999.[9] Thus, the United States must again use air mobility to deploy forces overseas in a minimum amount of time for an operation to be successful.

Policy Affects Air Force Issues

A policy of intervention has wide-ranging effects on Air Force issues that AMC exemplifies. First of all, the number of military interventions is on the rise. Second, this increase in military interventions has resulted in increased operations for the USAF and AMC that has reduced its force structure. Third, doctrine has not kept pace with USAF and AMC requirements that make adequate use of AMC's flexibility for rapid global mobility. The consequence of this lag is that a reduced force structure attempts to meet the growing requirements of an increased number of military interventions.

The requirement for air mobility will increase during this century for three reasons. First, the pace of interventions and consequent use of air mobility forces increased during the 1990s, and that pace is likely to remain high due to the large number of crises.[10] The limits of intervention imposed on us in a bilateral world, where the Soviet Union objected to many of our intended interventions, collapsed with the Soviet Union. Second, the end of the Cold War caused the rise of numerous ethnic groups and factions desiring authoritarian and ethnically pure states. In this century, enemies will be more varied and unpredictable. This makes a policy of prepositioning military equipment less effective. In order to deal with several possible enemies, the United States currently prepositions

equipment among several potential theaters. Thus, our military equipment is spread thinly. Third, only a limited number of forward bases is available to US military forces.[11] These factors require a change in our intervention strategy in future contingencies, and the most obvious solution is a need for greater air mobility capability.[12] To handle this increase, a capable air mobility strategy is crucial.

In addressing Air Force issues such as operations tempo, personnel tempo, and retention—as well as doctrine and organization—a capable air mobility strategy is also crucial. In compliance with the *QDR*, AMC bases its force structure on the requirement to prepare for two major theater wars.[13] Yet, it currently stretches its force structure to execute an increasing number of smaller-scale contingencies that support the NSS. This stretched force structure, working at an extremely high operations tempo, has created a dangerously high personnel tempo. Thus, the officers and enlisted personnel of AMC—whose duties require flexibility, accuracy, and commitment—perform their duties with inadequate personnel. In addition to the increased number of smaller-scale contingencies, the number of potential crises points worldwide has doubled since the Gulf War to approximately 70.[14] Further defining this dangerously high personnel tempo, the secretary of defense stated, "The United States intends to remain a political and military world leader."[15] These new requirements have imposed upon AMC a steady state of operations that requires unprecedented employment of its force structure.

A corollary issue is that the force structure has declined by nearly 50 percent while the number of peacetime commitments has increased.[16] Operational personnel work longer hours and experience much longer TDY assignments, many far beyond the 180-day average, to achieve the high operations tempo. In order to perform at this high operations tempo, AMC needs to reduce its personnel tempo by leveraging technology.

This high personnel tempo is a primary cause of low retention rates among operational personnel as exemplified in the pilot retention rate. Shortly after AMC's steady-state operations rose, their pilot retention rates declined. During the 1990s, air mobility forces experienced an escalation of all

types of smaller-scale contingencies by 32 percent.[17] The percentage of pilots accepting the pilot bonus reflects an alarming downward trend: 66 percent of the command's pilots accepted the pilot bonus in 1995; 49 percent in 1996; 24 percent in 1997; and 19 percent in 1998.[18] To increase pilot retention, the Air Force increased the pilot bonus from $12,000 to $22,000 in 1997, yet pilot retention continued to decline the following year.[19] AMC needs to research the reasons that its pilot retention is so low to determine if the decreasing pilot retention trend results from the extremely high personnel tempo as suggested by many pilots.[20]

A policy of intervention also affects doctrine and organizations within AMC.[21] The NSS relies on a strong military capability to deter conflicts before they arise in order to stop the escalation of confrontations or to deescalate military conflicts worldwide. In most instances, the NCA call upon air mobility to deploy forces, deliver supplies, and retrieve weapons to achieve the required deescalation. They do so because air mobility forces possess the unique capability to accomplish the lift requirements quickly—within hours when necessary. This capability of rapid global mobility empowers air mobility forces with the flexibility to change requirements as the crisis at hand changes. For example, the TACC at AMC headquarters often tasks aircraft—while already airborne in the performance of their mission—with a new destination or follow-on mission.

Joint doctrine does not deal extensively with air mobility's flexibility. For example, joint doctrine still requires four phases to deploy: predeployment activities; movement to and activities at port of embarkation; movement to port of debarkation; and joint reception, staging, onward movement, and integration activities.[22] However, all too often a contingency deployment does not follow the preplanned TPFDD, whose purpose is to execute the deployment, because of last minute strategy changes imposed by the NCA. In numerous instances, smaller-scale contingencies require a different configuration of military forces than previously planned. Operation Allied Force exemplifies this situation because of its unique requirement to exclude ground forces at the last minute. Therefore,

air mobility doctrine must reflect a unique flexibility to tailor—at the last moment—the deployment schedules of specific operations. Thus, air mobility is a critical tool of flexibility that the NCA often rely on.

The US policy of intervention also highlights the need for organizational changes within air mobility units. For example, the increased number of KC-135 sorties required during Operation Allied Force resulted in the reexamination of the KC-135's low crew ratio of 1:27 and the renewed call for a 1:56 crew ratio.[23] During the operation, the joint force commander, General Clark, insisted on a KC-135 crew ratio of 1:8; but because of the large numbers of KC-135s involved, additional crews could not be mustered.[24] Other organizational changes resulting from Operation Allied Force occurred when the director of mobility forces created a special duty assignment, director of tanker forces, in the combined air operations center at Vicenza, Italy.[25] However, both of these issues have reoccurred in nearly every operation during the 1990s and as such should be included into joint doctrine.[26] The Air Force Doctrine Center is researching these issues for incorporation into air mobility doctrine.[27]

An additional implication of a policy of intervention is the limited number of air mobility assets availability to transport the required equipment to a major theater war should one occur. With the call-up of both the ANG and AFRes tanker and airlift forces for Operation Allied Force, the availability of the required air mobility support for a nearly simultaneous major theater war would have been unattainable.[28] In addition, AMC experiences a shortfall on a daily basis in its requirement to transport outsized and oversized cargo, which only C-5s or C-17s are capable of performing.[29] To address these issues, the United States must leverage technology if it desires rapid global mobility to support the nation's military interventions and a capability to transition to a major theater war.

The increased number of military interventions coupled with the decrease in force structure create many challenges for the Air Force. To meet the challenges, the Air Force should first research the effects of increased intervention upon its force structure. Second, the Air Force should update its doctrine to

fully use the flexible capabilities of AMC versus the wasteful concept of prepositioning material that leaves another theater of operations needing more equipment. Third, the Air Force should build an AMC that can meet the needs of rapid global mobility, which transports required military equipment immediately, when needed, to the theater of operations, where needed. The most efficient means to achieve these seemingly simple, yet previously insurmountable, tasks is by exploiting military technological innovations.

Many technologies are applicable to mobility air forces. One such application would employ existing technology to build a strategic airlifter with intercontinental range that can fly nonstop without aerial refueling. This would eliminate strategic airlift reliance on the already overburdened tanker force and curtail the requirements imposed on the overburdened air mobility en route infrastructure. A second application of existing technologies would be to replace the half-century-old KC-135 with an aircraft that would double the KC-135's fuel offload capability and transport outsized and oversized cargo within the confines of a KC-135 footprint.[30] This would increase the tanker's dual-role capability and, again, curtail the reliance on the mobility en route infrastructure.

Military Technological Innovations

The US policy of intervention requires that it prepare against a wide range of threats by using various combinations of technology at different levels of intensity.[31] For instance, the need for rapid global mobility requires better communication and coordination in order to improve C^2 of the various operations required. To meet this challenge, AMC has implemented a couple of programs. First, in order to coordinate access to increasingly congested airways worldwide, the command must upgrade its aircraft with automatic dependence surveillance.[32] This surveillance system—already prevalent in the commercial airline industry—automatically reports an aircraft's location, heading, and speed through satellite to the receiving air traffic control center, which enables aircraft to fly closer together. Noncompliant aircraft are restricted from prime routes, creat-

ing longer missions that consume more fuel. In response to this requirement, AMC is installing avionics upgrades and a global air traffic management system to its aircraft. Second, the GTN enables the USTRANSCOM to maintain a high operations tempo while reducing the personnel tempo of its expediters. This information network—established in 1998—provides universal tracking to each item, crew member, and vehicle in the DTS whether en route or scheduled to depart. Any individual with a log-in name and password can access this network through the Internet and no longer needs to contact an expediter for information.

Technological innovations have also created newer, more efficient engines that can replace aging engines onboard AMC's fleet of C-5 aircraft. To achieve this, Lockheed Martin proposed a C-5 modernization program that includes new engines and the global air traffic management system that will extend the useful life of the C-5 beyond the year 2015.[33] However, these modifications fall short of addressing some of AMC's major issues. First, even with an upgraded C-5 fleet, AMC faces a shortfall in the requirement for transporting outsized and oversized cargo. Second, even with the projected increase in the C-5's range, it would still require air refueling for overseas sorties. Thus, upgrading the C-5 fleet ignores the high personnel tempo issue.

Technological innovations can also improve mobility operations by providing operational personnel with the needed technological leverage to perform the increased number of steady-state operations while reducing their personnel tempo. In achieving this goal, several aircraft manufacturers have plans to create larger and longer-range air transports and tankers because they perceive AMC as needing that capability. For example, planners at Lockheed Martin studied 30 different aircraft designs and sifted out four basic concepts.[34] All four of Lockheed's concepts provide more efficient operating costs to include 15 percent greater fuel economy, 30 percent improved lift-to-drag ratios, and 25 percent lighter airframes.[35] The largest of Lockheed's concepts estimates a 12,000 NM range, which would eliminate the need to air refuel an airlifter on global missions.

As noted earlier, range is important in relieving the bottlenecks imposed by a smaller en route infrastructure. The C-17, currently employed as a strategic airlifter, has a shorter range than either the C-141 or the C-5. Thus, the C-17 is dependent on either aerial refueling or the en route infrastructure. One congressional study identifies the C-17 as a replacement for the C-141, and another congressional study cites it as the replacement for the C-5.[36] Yet, the current acquisition program provides neither enough C-17s to replace the C-141 fleet nor enough C-17s to replace the C-5 fleet. AMC needs a new strategic airlifter capable of transporting outsized and oversized cargo that is independent of aerial refueling and requires less support from the mobility en route infrastructure.

If AMC can eliminate the need to air refuel its transports on global missions, it can meet the need for tanker support to combat aircraft while reducing the tanker fleet's personnel tempo. Combat aircraft use smaller fuel tanks in order to attain greater maneuverability, but smaller tanks translate to shorter range. Air refueling is a powerful force multiplier that produces tremendous operational and tactical flexibility far and above simple range extension.[37] Another one of Lockheed's concepts, the joined-wing design, provides innovative solutions to the tanker fleet by refueling two combat aircraft at once.

Both Congress and the USAF itself have delayed desperately needed technological advances for AMC. Congress is forcing AMC's pursuit of technological advance to remain at a snail's pace due to the congressional agreements limiting the DOD budget. However, Congress will have to provide funding to obtain new air mobility designs if the armed forces are to have the rapid global mobility capability that the NSS requires. Despite the requirement to improve air transport capability, the Air Force seems narrowly focused on development and procurement of the F-22 at the expense of other critically important air mobility technological requirements. The Air Force has repeatedly emphasized the F-22 program in public and before Congress.[38] In contrast, the CINCTRANSCOM seems to go it alone with little congressional or service support, when requesting technological advancements for AMC.

Pursue New Air Mobility Aircraft Designs

Peacetime military innovation occurs when respected senior military officers formulate a strategy for innovation.[39] Albeit the concept of air mobility is not new, Gen Ronald R. Fogleman became an advocate in 1992 while assigned as the CINC-TRANSCOM and then subsequently Air Force chief of staff. A change in the strategic security environment resulting from the collapse of the Soviet Union may have been the catalyst for his advocacy.[40] With the collapse of the Soviet Union, the security environment became more uncertain because the United States is no longer in a bipolar world. Uncertainty in the security environment arose from questions about the national interests that the United States would face in a multipolar world or in a world where the United States would face asymmetric threats from weaker enemies. The concept of rapid global mobility provides the United States with the means to project its military capabilities around the world to either punish an act of aggression, preempt an act of aggression, or deter an act of aggression. It is important to develop air mobility into a rapid global mobility force that has the flexibility to transition from the steady-state operations to a major theater war.

Now is the time to pursue innovations in air transport design, rather than waiting for a major theater war. Once built and employed during peacetime, analysis on the new designs can accrue and errors can be recognized and corrected before their use in war.[41] This environment encompasses a vast array of potential crisis spots on the globe, which requires a greater reliance on rapid global mobility, whose reduced force structure and worldwide infrastructure currently limit our capabilities.

According to Stephen Peter Rosen, the United States can best face the issues associated with choosing new technologies by managing uncertainty.[42] Looking through his lens, air mobility becomes a priority for force structure modernization because if the proper configurations of equipment cannot arrive in-theater when required, the ability of the United States to intervene in a crisis greatly diminishes. The United States needs to emphasize mobility forces now because the most opportune time for technological advancements occurs during peacetime.[43]

Update the Force Structure

The NSS defines national interests that extend beyond the US borders; and in doing so, it establishes a requirement for military intervention to secure those interests. In citing the requirement for intervention, the secretary of defense—through the *QDR*—identifies several different types of interventions that the United States must prepare for. This policy of intervention, which the United States has employed numerous times since the end of the Cold War, affects several force structure issues to include an increased operations tempo and an increased personnel tempo. In addition, the concept of rapid global mobility has become the means to achieve effective military intervention and, as such, has become the backbone of both military and peacetime operations. The resulting increase in the need for air mobility operations has occurred alongside the decline of both the air mobility force structure and the worldwide air mobility infrastructure. In order to meet the challenges created in the new strategic environment, AMC must continue its pursuit of technological innovations to include new aircraft designs. New airlift designs should include intercontinental range without aerial refueling, and new tanker designs should provide for greater cargo capacity combined with greater offload capability. AMC can modernize most of its aging fleet of aircraft in order to address some issues. However, only a fleet of larger and longer-range air transports will reduce the personnel tempo while maintaining a high operations tempo. If the United States fails to meet this challenge, it limits its ability to intervene in crises and, consequently, degrades its leadership position in the world.

Notes

1. *A National Security Strategy for a New Century* (Washington, D.C.: Government Printing Office [GPO], October 1998), 6.
2. Ibid., 8–12.
3. National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Washington, D.C.: GPO, December 1997), ii.
4. Chief of Staff, Air Force, *A 21st Century Air Force* (Washington, D.C.: DFI International, 1997), 3.
5. *A National Security Strategy for a New Century*, 11.
6. Ibid., 15.

7. Ibid., 21.

8. National Defense Panel, 33.

9. Col Michael Fricano, "Future Directions of Air Mobility," *Mobility Requirements Study 05*, 42. Slide presentation at the December meeting of the Maxwell chapter of the Airlift/Tanker Association, 13 December 1999.

10. Ibid., 21.

11. William S. Cohen, secretary of defense, *Report of the Quadrennial Defense Review* (Washington, D.C.: GPO, May 1997), 6–7.

12. John M. Shalikashvili, *Joint Vision 2010* (Washington, D.C.: Office of the Chairman of the Joint Chiefs of Staff, 1996), 14–15.

13. National Defense Panel, 21–24.

14. US Senate Armed Services Committee, *Prepared Statement of Gen Robert Rutherford, Commander in Chief, USTRANSCOM*, 104th Cong., 1st sess., 23 February 1995.

15. Linda D. Kozaryn, "America Won't Shrink from Global Role, Cohen Says," American Forces Press Service, 18 November 1999, 1; on-line, Internet, available from http://www.defenselink.mil/news/Nov1999/n11191999_9911191.html.

16. Chief of Staff, Air Force, *A 21st Century Air Force*, 5.

17. Chief of Staff, Air Force, *Merits of Air Mobility, Enduring Value to the Nation and the World* (Vienna, Va.: Point One, 1999), 41.

18. Headquarters AMC/DPXPA.

19. Fricano.

20. Casual conversations with scores of air mobility pilots over the last seven years revealed a common belief among them that the high personnel tempo is driving air mobility pilots out of the Air Force.

21. Charles E. Miller, *Airlift Doctrine* (Maxwell Air Force Base [AFB], Ala.: Air University Press, March 1988), 474.

22. Joint Publication 3-35, *Joint Deployment and Redeployment Operations*, 7 September 1999, III-1.

23. Gen Charles T. Robertson, keynote speech to the Airlift/Tanker Association, Dallas, Tex., 6 November 1999.

24. John A. Tirpak, "Airlift Reality Check," *Air Force Magazine*, December 1999, 36.

25. Ibid.

26. Ibid.

27. Maj Gary Potter, director of Air Mobility Doctrine, Air Force Doctrine Center, Maxwell AFB, Ala., interviewed by author, 5 November 1999.

28. Tirpak, 32.

29. Fricano, 68.

30. Footprint refers to the physical size of an aircraft both in wingspan and fuselage length, as well as the pounds per square inch of the landing gear.

31. Shalikashvili, 11.

32. Bill Sweetman, "A Rising Imperative: More Demands for Airlift," *Jane's International Defense Review*, 2 January 1998, 22.

33. Fricano, 66.

34. David A. Fulghum, "Future Airlifters Promise Global Range," *Aviation Week and Space Technology*, 20 January 1997, 51.

35. Bill Gregory, "Tanker-Transports: Future Airlifters Are Likely to Be Versatile Multimission Aircraft," *Armed Forces Journal International,* December 1997, 18.

36. AMC, *Strategic Airlift: Improvements in C-5 Mission Capability Can Help Meet Airlift Requirements,* General Accounting Office (GAO)/NSIAD-96-43 (Washington, D.C.: GAO, November 1995); and AMC, *Military Airlift: Options Exist for Meeting Requirements While Acquiring Fewer C-17s,* GAO/NSIAD-97-38 (Washington, D.C.: GAO, February 1997).

37. Lloyd Matthews, *Challenging the United States Symmetrically and Asymmetrically: Can America Be Defeated?* (Carlisle Barracks, Pa.: US Strategic Studies Institute, July 1998), 29.

38. Robert Wall, "Pace of F-22 Testing Puts USAF Under Fire," *Aviation Week and Space Technology,* 27 March 2000, 36.

39. Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, N.Y.: Cornell University Press, 1991), 21.

40. Ibid., 251.

41. Ibid., 182.

42. Ibid., 251.

43. US Congress, *Moving US Forces: Options for Strategic Mobility* (Washington, D.C.: Congressional Budget Office, February 1997), 4.

Chapter 7

Conclusions

Obtaining additional air transport mobility—and obtaining it now—will better assure the ability of our conventional forces to respond, with discrimination and speed, to any problem at any spot on the globe at a moment's notice.

—President John F. Kennedy

I began this study by examining the force structure complexities of the Air Force's largest and most diverse command, Air Mobility Command. I next examined the mobility force structure requirements and challenges in air mobility planning. Force structure developed from the two major theater wars model established by the *MRS BURU,* where rapid mobility conducted by mobility air forces would reduce the risk to friendly forces.

An analysis of combatant planning and mobility planning reveals incongruities involved with developing a TPFDD. Air mobility planning succumbs to consensus planning, where compromises can take priority over expediency. The planning process assumes air and sea superiority to protect both air and sea lines of communication. The *MRS BURU* analyzed four scenarios to identify the challenges with prepositioning, sea lift, and airlift. An examination of the two major theater wars model identified the reasons for designing the current force structure for AMC.

The study then analyzed current force structure capabilities. An examination of current force structure included an analysis of the different airframes' capabilities and limitations, which identified exactly where the airlift shortfall occurs. A corollary examination of the en route force structure further revealed additional shortfalls in throughput. The study consequently revealed that the current force structure is unable to meet the demands imposed by a two major theater wars model. An examination of the tanker fleet revealed a third shortfall in the air mobility system. The proposed upgrades to these areas will take 20 years to complete but do not address the need for more airframes.

Finally, this study examined the growing number of steady-state operations that mobility air forces have been conducting throughout the 1990s and will continue to conduct during this century. In addition, these steady-state operations occur at the last minute, which circumvents the TPFDD planning process. The force structure requirements that stem from the growing number of contingency operations require a flexible and rapid global mobility system that only AMC can provide. Mobility air forces work to support steady-state operations. Contingency operations require GRL units comprised of ad hoc personnel who deploy away from their permanent duties, thus leaving a shortfall in their organization. Furthermore, a number of contingencies overlap at any given time. It becomes clear that USTRANSCOM requires a force structure comprised of airlifters able to perform numerous missions and personnel to work the expeditionary en route infrastructure of the GRL concept.

Air Mobility Shortfall: Two Major Theater Wars

This study sought an answer to the question: Can AMC's force structure—based on the possibility of fighting two major theater wars—satisfy those requirements and the requirements for steady-state operations? What this study found was that the current force structure can neither meet the requirements imposed by the *MRS BURU* for two major theater wars nor meet the requirement for steady-state operations. AMC is finding it difficult to prepare for two major theater wars while maintaining the increased number of steady-state operations that are both diverse in their objectives and their transportation requirements. Yet, the need for air mobility is increasing due to several factors, such as overseas basing reductions and the decreasing number of military airlifters in service. These dynamic influences create a tremendous challenge for the force structure of AMC.

AMC's current force structure creates a type of identity crisis that results in funding problems as well as other challenges associated with a constrained force structure. This study tried to bring into focus the inadequacy of the current force structure of AMC. A compromise force structure—such as one that may

occur, due in part to the C-17 acquisition program—is likely to reduce AMC capabilities. The currently proposed fleet of C-17s will face insurmountable challenges in attempting to satisfy the requirements of today's steady-state operations. Furthermore, the cost of a compromise will occur in the form of higher risks to military forces and US interests abroad.

Continued US Intervention

Air mobility is a form of airpower that should be exploited to its fullest because of the positive political gains from noncombat operations, deterrence, and combat when necessary. However, steady-state operations in support of the NSS have created an unprecedented use of AMC forces and resources that are currently targeted for wartime use.

The United States is likely to continue a policy of intervention. The concept of rapid global mobility has become the means to achieve military intervention and, as such, has become the backbone of both military and peacetime operations. The force structure of AMC is straining to execute these steady-state operations. Further growth in these operations is beyond the capability of AMC's current force structure.

This policy affects the force structure of AMC in many ways. The resultant increased operations tempo and personnel tempo occurred alongside the declination of AMC's force structure. If AMC is to achieve the objectives of the NSS, it must continue its pursuit of technological innovations to include new aircraft designs. AMC can modernize most of its aging fleet of aircraft in order to address some issues, but only more airframes with a healthy crew ratio can maintain the high operations tempo required by the NSS. AMC, as with any organization, must have a force structure to maintain or reduce its operations. AMC is already looking for ways to reduce the demands on its system.[1]

Price of Reduced US Intervention

If AMC reduces its operations, the United States will pay a price. If the United States is unable to achieve the objectives

of its NSS, then it will degrade its international leadership position. It is important to continue conducting US interventions to achieve the national security objectives. Rapid global mobility is the concept that makes these operations a success. AMC, as the lead component for rapid global mobility, requires a force structure capable of conducting these operations.

Recommendations

This study examined the force structure of AMC and identified several challenges for AMC if it is to achieve the objectives set forth in the NSS. The current force structure falls short of the targeted strategic environment that it sought to fulfill. In addition, the current force structure is incongruent with the vast diversity of requirements in today's strategic environment, which range from coercive military operations to humanitarian relief operations. The following five recommendations aim to outline how AMC's force structure can be redirected to more effectively perform its missions to achieve the objectives of the NSS and to operate in the strategic environment.

Force Structure Based on Steady-State Operations

Most importantly, the Air Force should investigate the need to build a force structure for AMC based on the current steady-state operations. Since the Gulf War, steady-state operations have employed mobility air forces in numerous different operations that require flexibility (appendices A through E).[2] Consequently, AMC should determine how it employed mobility air forces engaged in steady-state operations. Perhaps the next *MRS BURU,* scheduled for completion in 2005, should examine the MTM/D for each operation that AMC executed during the 1990s, of which there were scores. In constructing a force structure based on steady-state operations, several subsequent recommendations follow.

Employ Commercial Carriers

The first tenet of airlift policy is that the core of national airlift capability is the commercial air carrier.[3] Continued re-

liance on the commercial air carrier industry to supplement AMC by transporting passengers and bulk cargo helps alleviate the expense of mobility air operations. In addition to using their own aircraft, commercial air carriers use civilian infrastructures worldwide to transport passengers and cargo. Military airlift requirements, in both aircraft and en route infrastructure, exceed the capability that DOD can afford to buy. AMC can operate a smaller than required en route infrastructure because of its reliance on the commercial sectors. AMC already maximizes its employment of commercial air carriers. This study recommends continuing this partnership where AMC employs commercial carriers during peacetime through contracts and uses them during wartime as the CRAF.

Longer-Range Airlifter

AMC should increase its strategic airlift capability with a new strategic airlifter that can operate without refueling at intercontinental range and can transport both outsized and oversized cargo. The second tenet of airlift policy states, "The role of the military airlift fleet is to do what commercial transport aircraft or civilian aircrews cannot or won't do."[4] Commercial aircraft designs are inadequate for outsized and oversized cargo. Consequently, AMC relies on its organic airlifters.

The third tenet of airlift states that AMC should design military airlifters for their role.[5] A strategic airlifter should have an intercontinental range to alleviate both aerial refueling and en route refueling. A reduced requirement for aerial refueling of airlifters will free up tanker assets for other missions already in demand. A reduced requirement for en route refueling will alleviate the bottlenecks already prevalent in AMC's en route infrastructure. AMC should examine these requirements as part of the program requirements for a new strategic airlifter. The C-17 falls short of these necessary requirements.

To transport required amounts of outsized and oversized cargo, AMC must increase its organic airlift capability because commercial carriers are too small and require additional onloading and off-loading equipment to transport outsized and oversized cargo. A new strategic airlifter, if properly programmed, can achieve the requirements imposed by national

strategic objectives while at the same time operate with reduced support. Thus, AMC could airlift more cargo with less of its assets.

AMC should also examine the feasibility of employing hypersonic technology because of the long time frame involved with the acquisition of a new airlifter. As hypersonic technology advances, perhaps AMC could employ the technology in a new strategic airlifter. A hypersonic airlifter acquisition program could offset hypersonic research. So long as a hypersonic design would employ a small en route infrastructure and negate the need for aerial refueling, this idea conforms to this study's recommendation for a strategic airlifter.

New Tanker Force Structure

SAC designed the current tanker force to perform its SIOP. Today, tanker forces require greater flexibility to meet the demands of the steady-state operations that they perform daily. Of the two overarching requirements, the immediate requirement is to increase the tanker's crew ratio. As noted earlier, the tanker force has been overextended for 10 years, which has resulted in low crew retention. Second, AMC needs to examine its requirement for a new tanker aircraft because the SIOP is only one of many missions that the tanker now performs. AMC is standing up the KC-XX branch in its Plans Division to examine the requirements for a new tanker.[6] This branch should examine tanker usage during the past 10 years to gain insight into how the tanker has become the critical asset in today's steady-state operations. The Plans Division also needs to examine the unfulfilled requirements of tanker forces—that is, those requests for tanker support that were denied due to the inadequate size of the tanker fleet.

Continue Upgrade Programs

The current upgrade programs aim to bring mobility air forces "up to code." These programs enable yesterday's aircraft to conform to aviation regulations and operate in today's aviation environment. These upgrade programs address the short-term requirements of maintaining AMC's capability to

operate in the skies of nations worldwide. In addition, these upgrades will help to lengthen the lifespan on the C-5 and KC-135 in order to facilitate the necessary examinations of both strategic airlift and aerial refueling requirements by AMC.

Bottom Line

The situation for air mobility has changed. Today's strategic environment differs from the one prophesied when the Cold War ended 10 years ago. To achieve diverse objectives, the NSS seeks to employ mobility air forces for a range of operations more so than in the past. In achieving these objectives, both airlifters and tankers perform a variety of missions, some of which are incongruent with past missions. Consequently, AMC's force structure should reflect these new requirements. Finally, the Air Force should allocate resources to create a force structure for AMC that can achieve national objectives.

Notes

1. The newest request for research, proposed by US Transportation Command, is to find ways to reduce the demands on the air mobility system. Information obtained by E-mail that was sent from the Air Mobility Command (AMC) Chair at Air University, Col John Brower, to all Air University students in January 2000.
2. See the appendices of this study for a list of operations the AMC has performed during the 1990s.
3. Lt Col Robert C. Owen, "The Airlift System: A Primer," *Air Power Journal*, Fall 1995, 1–12, 6.
4. Ibid., 8.
5. Ibid., 9.
6. Gen Charles T. Robertson, speech to the Maxwell chapter of the Airlift/Tanker Association, Maxwell Air Force Base, Ala., 2 March 2000.

Appendix A

Emergency Relief Operations

Event	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Hurricane Andrew	25 Aug 28 Oct 92	724	13,500	21,500.0				AMC/HO
Byelorussian Children	31 Aug 92	70	1					AMC/HO
Typhoon Omar	1 Sep 25 Sep 92	59	750	2,000.0				AMC/HO
Liberia Evacuation	12 Oct 92	1	21					AMC/HO
Armenia Flour Delivery	4 Nov 11 Nov 92	5		236.0				AMC/HO
Pakistan Flood Relief	6 Dec 20 Dec 92	6		415.0			Outsized cargo	AMC/HO
Bosnian War Victims	3 Feb 93	1	8					AMC/HO
UN Support in Cambodia	17 May 29 May 93	24	254	326.0	11	0.14		AMC/HO
UN Protection in Macedonia	5 Jul 12 Jul 93	20	334	850.0				AMC/HO
Midwest Flood	11 Jul 1 Aug 93	20	141	797.0			Used ANG & AFRes	AMC/HO
Nepal Flood	11 Aug 15 Aug 93	3						AMC/HO
Support UN in Somalia	25 Aug 27 Aug 93	5	400					AMC/HO
	26 Aug 19 Dec 93	8		147.0				AMC/HO
	1994	6		191.9				AMC/HO
Indian Earthquake	4 Oct 93	2						AMC/HO
Marine Support in Somalia	5 Oct 13 Oct 93	56	1,300	3,000.0	169	13.4	Outsized cargo	AMC/HO
Nepal Support in Somalia	24 Oct 30 Oct 93	5	350	250.0				AMC/HO

Event	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Los Angeles Earthquake	17 Jan 25 Jan 94	10	10	170.0			Outsized cargo	AMC/HO
Somalia Redeploy	25 Mar 94	1						AMC/HO
Rwanda Evacuation	10 Apr 14 Apr 94	2	342					AMC/HO
Belgian support to Rwanda	10 Apr 14 Apr 94	12					Outsized cargo	AMC/HO
Tanzania support	11 May 17 May 94	13		239.0				AMC/HO
Uganda support	22 Jun 30 Jun 94	72	TALCE	150.0			Outsized cargo *est. tons & sorties	AMC/HO
MRI system to Ukraine	26 Jun 94	1		34.3				AMC/HO
Hurricane John evacuation	14 Aug 25 Aug 94	9	1,107				3 Commercial	AMC/HO
Vladivostok Flood	30 Oct 94	1		20.0				AMC/HO
Nepal support to Haiti	3 Feb 10 Feb 95	8	410					AMC/HO
Mongolia support	1991 11 Apr 95	12		300.0			*Estimate 25 tons average	AMC/HO
OK Fed building bombing	19 Apr 4 May 95	25	1,359	3,864.0			Outsized cargo	AMC/HO
Zaire medical support	11 May 95	1		1.0			Ongoing effort	AMC/HO
Hump Anniversary	23 May 30 May 95	2			2			AMC/HO
Haitian police support	8 Jun 95	3	350				First of 5,200 police	AMC/HO
NASA support	7 Jul 95	1	3					AMC/HO
Croatia support	13 Aug 95	1		75.0				AMC/HO
Tadzhikistan support	17 Aug 95	1		38.0			Contracted DC-8	AMC/HO

Event	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Rwanda support	6 Sep 95	1		168			Contracted 747 *42 pallets x 2 ton ea.	AMC/HO
Croatia support	6 Sep 95	1		36.0			Contracted DC-8 *18 pallet x 2 ton ea.	AMC/HO
Kurdish support	7 Sep 95	2					2 Generators outsize cargo	AMC/HO
Hurricane Marilyn	16 Sep 10 Oct 95	212	2,348	3,617.0				AMC/HO
Vietnam medical support	3 Oct 95	1		28.0				AMC/HO
Mine field markers	2 Feb 96	3		40.0	6			AMC/HO
Israel support	5 Mar 96	1		1.4	1	0.09	Explosive-detection	AMC/HO
Retrieve remains Laos	27 Mar 96	1					Remains from Laos 25 yrs ago	AMC/HO
Retrieve remains of SecCom	6 Apr	1					12 bodies total	AMC/HO
Uphold Democracy redeploy	17 Apr 96	1	84				Commercial carrier	AMC/HO
Khobar Towers retrieve remains	27 Jun 96	1					19 bodies	AMC/HO
AEF III	30 Jun 96				4		Augment Southern Watch	AMC/HO
Mongolia support	2 Aug 96	1		24.0			2 stowaway fatalities	AMC/HO
Burundi support	4 Sep 96	1	30	1.0				AMC/HO
Northern Watch support	11 Sep 96	2					Outsized cargo	AMC/HO
Pacific Haven	17 Sep 18 Sep 96	2	44					AMC/HO

Event	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Guardian Assistance	14 Nov 96	5					Deployed standby for relief operations	AMC/HO
Christmas airdrop	16 Dec 21 Dec 96							AMC/HO
Retrieve remains WW II	16 Jan 97	1					5 aircrew from B-24 Liberator	AMC/HO
Sioux relief	19 Jan 97	1		20.0			AFRes crew	AMC/HO
Last Deep Freeze sortie	2 Mar 97						Supplying Antarctica for 40 years	AMC/HO
Bolivia support	2 Apr 97	1					Diocese of Joliet medical supplies	AMC/HO
Grand Forks flood	18 Apr 8 Aug 97	13	143	146				AMC/HO
Korean crash support	5 Aug 9 Aug 97	5	31				NTSB, +FBI, +FAA, +medical personnel	AMC/HO
NASA support	22 Aug 97	1			2		Satellite	AMC/HO
Bulgaria support	3 Oct 97	1		175				AMC/HO
Typhoon Paka	18 Dec 97 4 Jan 98						Some commercial	AMC/HO
New Mexico blizzard relief	30 Dec 97 4 Jan 98	5		25.0				AMC/HO
Operation Recuperation	10 Jan 14 Jan 98	4		181.0			Quebec winter storm	AMC/HO
NE winter storm	15 Jan 18 Jan 98	18						AMC/HO
China earthquake	16 Jan 98	1		40.0			40 tons on 18 pallets	AMC/HO
Ecuador support	2 Mar 98	1	6					AMC/HO
Presidential support	9 Mar 9 Apr 98	104			100		Trip to Africa	AMC/HO

Event	Dates	Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
OP Homecoming silver anniversary	12 Mar	1	50					AMC/HO
Presidential support	10 Jun 8 Jul 98	35			7		Trip to China	AMC/HO
Search & Rescue Support	19 Jun 98	2			1		AFRes crews	AMC/HO
Operation Phoenix Flame	2–7 Jul 98	12	300	740.0			Everglades fires	AMC/HO
Transport remains of unknown soldier	10 Jul 98	1						AMC/HO
Kenya embassy bombing support	7–9 Aug 98	2	15				15 patients—1 sortie 10 remains—1 sortie	AMC/HO
Hurricane Georges	21 Sep 12 Oct 98	190	450	8,500.0				AMC/HO
Hurricane Mitch	1 Nov 98 19 Mar 99	200						AMC/HO
Christmas Island support	9–10 Jan 99	1	1					AMC/HO
Presidential support	22 Jun 99	1	3					AMC/HO
Antarctica support	11 Jul 99	1		12.0	1		*6 pallets airdrop estimate 12 tons	AMC/HO
Turkish earthquake	18 Aug 10 Sep 99	20	70		2		First sortie refueled	AMC/HO
KC-97 transport	14 Oct 99	1					From Beale to Scott	AMC/HO
Antarctica support	16 Oct 99	1					Chemo-therapy drugs	AMC/HO
Totals		468	889	9,252	11	0		

Appendix B

Humanitarian Operations

Operation	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel Transfer	Remarks	Source
Nuclear Forces Initiative	Sep 91 Jun 92							AMC/HO
Provide Hope	Jun 92 May 93	109		2,438			25 commercial sorties	AMC/HO
	thru 7 Apr 95	300						AMC/HO
	thru 17 Jun 97	500						AMC/HO
Provide Promise	3 Jul Sep 93	1,694	35,035	6,515			Used ANG & AFRes	AMC/HO
Provide Transition	Aug 92 Oct 93	326	8,805	265				AMC/HO
Provide Relief	Aug 92 Feb 93	3,100	0	34,400				AMC/HO
NATO Minister Agreement	to 25 Sep 92							AMC/HO
Impressive Lift	13 Sep 29 Sep 92	94	974	1,168				AMC/HO
Provide Refuge	13 Feb 9 Mar 93	4	812	149			3 commercial sorties	AMC/HO
Provide Promise	8 May 26 Jul 94	382		7,000				AMC/HO
Support Hope	22 Jul 11 Sep 94	700	11,000	23,000	448		President—immediate massive increase	AMC/HO
Deny Flight	23 Aug 94							AMC/HO
Project Sapphire	21 Nov 23 Nov 94	2		1	4		Enriched uranium	AMC/HO
Safe Passage	1 Feb 95 31 Jan 96	161	27,000				Contract - Miami Air	AMC/HO
Quick Lift	30 Jun 10 Aug 95	27	4,742	1,504				AMC/HO
Joint Endeavor	4 Dec 95 16 Sep 97	8,000						AMC/HO

Operation	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel Transfer	Remarks	Source
Provide Promise (update)	3 Jul 93 9 Jan 96	13,000		160,000				AMC/HO
Assured Response	7 Apr 6 May 96	103	2,153	2,148				AMC/HO
Desert Focus	18 Aug 96	1	300				Contract 747	AMC/HO
Noah's Ark	17 Aug 97	1					90 dogs & cats	AMC/HO
Guardian Retrieval	21 Mar 17 Apr 97	115	1,200	2,400				AMC/HO
Baltic Challenge 98	8 Jul 20 Jul 98	2					AFRes	AMC/HO
Kieko Lift	9 Sep 10 Sep 98	1	12		3			AMC/HO
Shining Hope	4 Apr 8 Jul 99	124	913	5,939				AMC/HO
Provide Refuge	5 May 99		3,000				Contracted Carrier	AMC/HO
Totals		13,347	7,578	170,487	3			

Appendix C

Military Operations

Operation	Dates	Total Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Southern Watch	18 Aug 92–ongoing							AMC/HO
Restore Hope	Dec 92–May 93	1,182	51,431	41,243	1,170	82.4		AMC/HO
Uphold Democracy	8 Sep–31 Dec 94	1,528	15,000		92			AMC/HO
Vigilant Warrior	10–13 Oct 94		400					AMC/HO
Somalia II	7 Jan 24 Mar 95	59	1,400	1,400			Used commercial carriers	AMC/HO
Desert Strike	2 Sep 3 Sep 96	1	75					AMC/HO
Phoenix Scorpion I	19 Nov 25 Nov 97	51		3,000	208	7.4	Air bridge to augment Southern Watch	AMC/HO
Phoenix Scorpion II	8 Feb 3 Mar 98	300	10,000	11,000	200	4.7	Deployment phase	AMC/HO
Phoenix Duke I	11 Oct Nov 98						Never used deployed assets	AMC/HO
Phoenix Duke II	18 Feb 24 Mar 99						Allied Force buildup with 150 tankers	AMC/HO
Totals		3,347	78,306	56,643	1,670	94.5		

Appendix D

Exercises

Exercise	Dates	Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Intrinsic Action	2–20 Aug 92	53	1,000	3,767				AMC/HO
Ocean Venture	Apr–May 93	493	16,000	6,700	137	4.3	Some commercial	AMC/HO
Peacekeeper 94	30 Aug–12 Sep 94	52	320	610				AMC/HO
Peacekeeper 95	19 May–1 Jun 95	50	300	430				AMC/HO
Coronet Bat	2–3 Jun 95				6			AMC/HO
Paratroop Drop	27 Jun 95	6	204	55.0				AMC/HO
Cooperative Nugget	5–29 Aug	14						AMC/HO
Intrinsic Action	17 Aug 95	100	2,200	1,300			Some commercial	AMC/HO
Big Drop III	15 May 96	136	3,700					AMC/HO
Cornerstone 96	28 May 96	1		16			Romania—4 pallets 4 trucks-est. tons	AMC/HO
Centrazbat 97	14 Sep 97	8	500		24		Paratroopers to Kazakhstan	AMC/HO
Purple Dragon	28–29 Jan 98	60						AMC/HO
Totals		913	24,224	12,878	167	4.3		

Appendix E

Totals

Exercise	Dates	Airlift Sorties	Passengers	Tons of Cargo	Refuel Sorties	Fuel in Millions	Remarks	Source
Totals	1 Jun 92–29 Oct 99	34,830	222,691	364,806	2,598	112		

Bibliography

Books

Betts, Richard K. *Surprise Attack: Lessons for Defense Planning.* Washington, D.C.: Brookings Institution, 1982.

Cirafici, John L. *Airhead Operations—Where AMC Delivers: The Linchpin of Rapid Force Projection.* Maxwell Air Force Base (AFB), Ala.: Air University Press, March 1995.

Cohen, Dr. Eliot A. *Gulf War Air Power Survey.* Vol. 3, *Logistics and Support.* Washington, D.C.: Government Printing Office (GPO), 1993.

Coté, Owen, Jr. *Strategic Mobility and the Limits of Jointness.* Center for Science and International Affairs monograph. Cambridge, Mass.: Harvard University Press, 1998.

Gordon, Michael R., and Bernard E. Trainor. *The Generals' War: The Inside Story of the Conflict in the Gulf.* Boston: Little, Brown & Co., 1995.

Gouré, Daniel, and Christopher M. Szara. *Air and Space Power in the New Millennium.* Washington, D.C.: Center for Strategic Studies and International Studies, 1997.

Haass, Richard N. *Intervention: The Use of American Military Force in the Post-Cold War World.* Washington, D.C.: Carnegie Endowment for International Peace, 1994.

Hutcheson, Keith A., and Charles T. Robertson. *Air Mobility: The Evolution of Global Reach.* Vienna, Va.: Point One, September 1999.

Keaney, Thomas A., and Eliot Cohen. *Revolution in Warfare? Air Power in the Persian Gulf.* Annapolis, Md.: Naval Institute Press, 1995.

Matthews, Lloyd. *Challenging the United States Symmetrically and Asymmetrically: Can America Be Defeated?* Carlisle Barracks, Pa.: US Strategic Studies Institute, July 1998.

McCaffery, Thomas. *Ready Reserve Force Contingency Crewing Requirements Study.* Alexandria, Va.: McCaffery & Whitener, 15 December 1995.

Miller, Charles E. *Airlift Doctrine.* Maxwell AFB, Ala.: Air University Press, March 1988.

O'Hanlon, Michael E. *Defense Planning for the Late 1990s: Beyond the Desert Storm Framework.* Washington, D.C.: Brookings Institution, 1995.

Pagonis, Lt Gen William G., US Army. *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War.* Boston: Harvard Business School Press, 1992.

Pape, Robert A. *Bombing to Win, Air Power and Coercion in War.* Ithaca, N.Y.: Cornell University Press, 1996.

Rosen, Stephen Peter. *Winning the Next War: Innovation and the Modern Military.* Ithaca, N.Y.: Cornell University Press, 1991.

Schelling, Thomas C. *Arms and Influence.* New Haven, Conn.: Yale University Press, 1966.

Journals, Magazines, and Periodicals

Begert, Lt Gen William J. "Kosovo and Theater Air Mobility." *Aerospace Power Journal,* Winter 1999.

Defense Transportation Journal, June 1999.

Fulghum, David A. "Future Airlifters Promise Global Range." *Aviation Week and Space Technology,* 20 January 1997.

Gregory, Bill. "Tanker-Transports: Future Airlifters Are Likely to Be Versatile Multimission Aircraft." *Armed Forces Journal International,* December 1997.

Grier, Peter. "The Comeback of CRAF." *Air Force Magazine,* July 1995.

Grossman, Elaine M. "OSD Debates How to Explain Military's Difficulty with Two-War Strategy." *Inside the Pentagon,* 26 January 1995.

Kitfield, James. "Airlift at High Tempo." *Air Force Magazine,* January 1995.

Mehuron, Tamar A. "USAF Almanac 1998: The Air Force in Facts and Figures." *Air Force Magazine,* May 1998.

Owen, Lt Col Robert C. "The Airlift System: A Primer." *Air Power Journal,* Fall 1995, 1–12.

Sweetman, Bill. "A Rising Imperative: More Demands for Airlift." *Jane's International Defense Review,* 2 January 1998.

Tirpak, John A. "Airlift Reality Check." *Air Force Magazine,* December 1999, 30.

"U.S. at 'High Risk' of Being Unable to Carry Out Two-War Strategy until 2006." *Inside the Pentagon*, 22 September 1994.

Wall, Robert. "Pace of F-22 Testing Puts USAF under Fire." *Aviation Week and Space Technology*, 27 March 2000, 33.

Manuals and Other Publications

Air Force Doctrine Document (AFDD) 1. *Air Force Basic Doctrine*, 1 September 1997.

AFDD 2-6. *Air Mobility Operations*, 25 June 1999.

AFDD 2-6.1. *Airlift Operations*, 13 November 1999.

AFDD 2-6.2. *Air Refueling*, 19 July 1999.

Department of the Air Force. *Global Reach—Global Power: The Air Force and US National Security*, White Paper. Washington, D.C., 1990.

———. *United States Air Force Statistical Digest, Fiscal Year 1996*. Washington, D.C.: Assistant Secretary of the Air Force for Financial Management and Comptroller, 1997.

Department of Defense, Logistics Directorate. *Mobility Requirements Study Bottom-Up Review Update*. Washington, D.C.: Joint Chiefs of Staff, 28 March 1995.

Joint Publication (JP) 1-02. *Department of Defense Dictionary of Military and Associated Terms*, 23 March 1994.

JP 3-35. *Joint Deployment and Redeployment Operations*, 7 September 1999.

JP 4-01. *Joint Doctrine for the Defense Transportation System*, 17 June 1997.

JP 4-05. *Joint Doctrine for Mobilization Planning*, 22 June 1995.

JP 5-03.1. *Joint Operational Planning and Execution System*. Vol. 1, *Planning Policies and Procedures*, 4 August 1993.

Newspaper Article

Jordan, Bryant. "Overloaded; Can the Airfleet Handle Two Wars at Once? By All Forecasts, No." *Air Force Times*, 30 August 1999.

RAND and Other Reports

Air Mobility Command (AMC). *1998 Air Mobility Master Plan: Rapid Global Mobility.* Scott AFB, Ill.: Directorate of Plans and Programs, October 1997.

———. *Air Mobility Command, Command Data Book.* Scott AFB, Ill.: Quality and Management Innovation Flight, November 1999.

———. *Air Mobility Strategic Plan 2000,* Infrastructure. Scott AFB, Ill.: Directorate of Plans and Programs, November 1999.

Bowie, Christopher. *The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns.* Report no. MR-149-AF. Santa Monica, Calif.: RAND, 1993.

Chief of Staff, Air Force. *A 21st Century Air Force.* Washington, D.C.: DFI International, 1997.

———. *Merits of Air Mobility: Enduring Value to the Nation and the World.* Vienna, Va.: Point One, 1999.

Cohen, William S., secretary of defense. *Report of the Quadrennial Defense Review,* Washington, D.C.: GPO, May 1997.

Department of Defense. *Report of the Defense Science Board Task Force on Strategic Mobility.* Washington, D.C.: Office of the Undersecretary of Defense for Acquisition and Technology, August 1996.

DeShetler, SSgt John. Combined Task Force (CTF) historian. *History of Operation Northern Watch.* Incirlik Air Base, Turkey: CTF, September 1999.

Fogleman, Ronald R., and Sheila E. Widnall. *Global Engagement: A Vision of the 21st Century Air Force.* Washington, D.C.: Department of the Air Force, 1996.

Gebman, Jean R., Lois J. Batchelder, and Katherine M. Peohlmann. *Finding the Right Mix of Military and Civil Airlift.* Vol. 2, *Issues and Implications.* Report no. MR-406/2-AF. Santa Monica, Calif.: RAND, 1994.

Goldwater–Nichols Department of Defense Reorganization Act of 1986. Public Law 433, 99th Cong., 2d sess., 1986.

History. *Air Mobility Command 1992 Historical Highlights.* Scott AFB, Ill.: AMC History Office, 1993.

———. *Air Mobility Command 1995 Historical Highlights.* Scott AFB, Ill.: AMC History Office, 1996.

Kassing, David. *Army and Marine Corps Prepositioning Programs: Size and Responsiveness Issues.* Report no. PM-378-CRMAF. Santa Monica, Calif.: RAND, April 1995.

———. "Strategic Mobility in the Post-Cold War Era." In *New Challenges for Defense Planning.* Edited by Paul K. Davis. Report no. MR-400-RC. Santa Monica, Calif.: RAND, 1994.

Lund, John, Ruth Berg, and Corinne Replogle. *Project AIR FORCE Analysis of the Air War in the Gulf: An Assessment of Strategic Airlift Operational Efficiency.* Report no. R-4269/4-AF. Santa Monica, Calif.: RAND, 1993.

Matthews, James K. *General Kross, Commander in Chief United States Transportation Command and Commander Air Mobility Command: An Oral History.* Scott AFB, Ill.: United States Transportation Command, October 1999.

Matthews, James K., and Cora J. Holt. *So Many, So Much, So Far, So Fast: United States Transportation Command and Strategic Deployment for Operation Desert Shield/Storm.* Washington, D.C.: Joint Chiefs of Staff, May 1996.

National Defense Authorization Act for Fiscal Year 1997. Public Law 104-201, 104th Cong., 2d sess., 921–26.

National Defense Panel. *Transforming Defense: National Security in the 21st Century.* Washington, D.C.: GPO, December 1997.

A National Security Strategy for a New Century. Washington, D.C.: GPO, October 1998.

Shalikashvili, John M. *Joint Vision 2010.* Washington, D.C.: Office of the Chairman of the Joint Chiefs of Staff, 1996.

Smith, Juliane K., Lt Col Steve Cheavens, and Maj Michael Zenk. *1991 Tanker Study.* Offutt AFB, Nebr.: Strategic Air Command, 1 March 1991.

Stucker, James P. *Analyzing the Effects of Airfield Resources on Airlift Capacity.* Santa Monica, Calif.: RAND, 1999.

Stucker, James P., et al. *Understanding Airfield Capacity for Airlift Operations.* Report no. MR-700-AF/OSD. Santa Monica, Calif.: RAND, 1998.

Thaler, David E., and Daniel M. Norton. *Air Force Operations Overseas in Peacetime: OPTEMPO and Force Structure Implications*. Project Air Force documented briefing. Santa Monica, Calif.: RAND, 1998.

US Congress. *Military Airlift: Options Exist for Meeting Requirements While Acquiring Fewer C-17s*. General Accounting Office (GAO)/NSIAD-97-38. Washington, D.C.: GAO, February 1997.

———. *Moving US Forces: Options for Strategic Mobility*. Washington, D.C.: Congressional Budget Office, February 1997.

———. *Strategic Airlift: Improvements in C-5 Mission Capability Can Help Meet Airlift Requirements*. GAO/NSIAD-96-43. Washington, D.C.: GAO, November 1995.

US Senate Armed Services Committee. *Prepared Statement of Gen Robert Rutherford, Commander in Chief, USTRANSCOM*. 104th Cong., 1st sess., 23 February 1995.

USTRANSCOM Handbook 24-2. *Understanding the Defense Transportation System*, 1 October 1998.

Vick, Alan, et al. *Preparing the U.S. Air Force for Military Operations other Than War*. Santa Monica, Calif.: RAND, 1997.

Slide Presentation, Speeches, and Video Recording

Fricano, Col Michael. "Future Directions of Air Mobility." *Mobility Requirements Study 05*. Slide presentation at the December meeting of the Maxwell chapter of the Airlift/Tanker Association, 13 December 1999.

Kozaryn, Linda D. "America Won't Shrink from Global Role, Cohen Says." American Forces Press Service, 18 November 1999, n.p. On-line. Internet, 19 November 1999. Available from http://www.defenselink.mil/news/Nov1999/n1119 1999_9911191.html.

Kross, Gen Walter. Keynote speech to the Airlift/Tanker Association convention. Anaheim, Calif., 25 October 1997.

Robertson, Gen Charles T. Keynote speech to the Airlift/Tanker Association convention. Dallas, Tex., 6 November 1999.

———. Speech to the Maxwell chapter of the Airlift/Tanker Association, Maxwell AFB, Ala.: 2 March 2000.

Sullivan, Michael. *The Gulf War.* Frontline: WGBH Educational Foundation, 1996. Two videocassettes.

Works That Exclude Mobility Force Structure

Bowie, Christopher. *The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns.* Report no. MR-149-AF, Santa Monica, Calif.: RAND, 1993.

Department of Defense, Logistics Directorate. *Mobility Requirements Study Bottom-Up Review Update.* Washington, D.C.: Joint Chiefs of Staff, 28 March 1995.

———. *Report of the Defense Science Board Task Force on Strategic Mobility.* Washington, D.C.: Office of the Undersecretary of Defense for Acquisition and Technology, August 1996.

Gebman, Jean R., Lois J. Batchelder, and Katherine M. Peohlmann. *Finding the Right Mix of Military and Civil Airlift.* Vol. 2, *Issues and Implications.* Report no. MR-406/2-AF. Santa Monica, Calif: RAND, 1994.

Kassing, David. *Army and Marine Corps Prepositioning Programs: Size and Responsiveness Issues.* Report no. PM-378-CRMAF. Santa Monica, Calif.: RAND, April 1995.

———. "Strategic Mobility in the Post-Cold War Era." In *New Challenges for Defense Planning.* Edited by Paul K. Davis. Report no. MR-400-RC. Santa Monica, Calif.: RAND, 1994.

Lund, John, Ruth Berg, and Corinne Replogle. *Project AIR FORCE Analysis of the Air War in the Gulf: An Assessment of Strategic Airlift Operational Efficiency.* Report no. R-4269/4-AF. Santa Monica, Calif.: RAND, 1993.

McCaffery, Thomas. *Ready Reserve Force Contingency Crewing Requirements Study.* Alexandria, Va.: McCaffery & Whitener, 15 December 1995.

Smith, Juliane K., Lt Col Steve Cheavens, and Maj Michael Zenk. *1991 Tanker Study.* Offutt AFB, Nebr.: Strategic Air Command, 1 March 1991.

Stucker, James P. *Analyzing the Effects of Airfield Resources on Airlift Capacity*. Santa Monica, Calif.: RAND, 1999.

Stucker, James P., et al. *Understanding Airfield Capacity for Airlift Operations*. Report no. MR-700-AF/OSD. Santa Monica, Calif.: RAND, 1998.

US Congress. *Military Airlift: Options Exist for Meeting Requirements While Acquiring Fewer C-17s*. GAO/NSIAD-97-38. Washington, D.C.: GAO, February 1997.

———. *Moving US Forces: Options for Strategic Mobility*. Washington, D.C.: Congressional Budget Office, February 1997.

———. *Strategic Airlift: Improvements in C-5 Mission Capability Can Help Meet Airlift Requirements*. GAO/NSIAD-96-43. Washington, D.C.: GAO, November 1995.

Vick, Alan, et al. *Preparing the U.S. Air Force for Military Operations other Than War*. Santa Monica, Calif.: RAND, 1997.

Index

Air Mobility

The Key to the United States National Security Strategy

Air University (AU) Library/AU Press Team

Chief Editor
Hattie D. Minter

Copy Editor
Rita B. Mathis

Book Design and Cover Art
Daniel M. Armstrong

Composition and Prepress Production
Mary P. Ferguson